

# MILITARY HISTORY

Subcourse Number IS7032

United States Combined Arms Center  
Fort Leavenworth, Kansas 66027-7000

4 Credit Hours

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## GENERAL:

1. Learning Objectives: After completing this subcourse you will be able to:

- Describe the evolution of combined arms warfare from the beginning of the 20th Century through the end of World War I.
- Define the basic terms and concepts of combined arms warfare.
- Identify and explain the major ways in which changes in military technology outstripped the development of combined arms doctrine prior to 1914.
- Describe the evolution of combined arms warfare during World War I.
- Describe the evolution of combined arms warfare from 1918 through 1945.
- Describe the evolution of combined arms doctrine during the interwar period, including factors which retarded development and important innovations.
- Describe the evolution of combined arms warfare during World War II.
- Describe the evolution of combined arms warfare since World War II.
- Identify and explain the major trends and principles in the evolution of combined arms during the 20th Century.

2. Lessons: There are three lessons in this subcourse:

- Combined Arms, 1900-1919.
- Combined Arms, 1919-1945.
- Combined Arms since WW II.

3. Administrative Instructions: Materials required to complete this subcourse are listed on page iv.

4. Subcourse Prerequisites: None.

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## **LESSON 1**

# **COMBINED ARMS, 1900-1918**

## **INTRODUCTION**

### **TASK DESCRIPTION:**

Upon completion of this lesson, you will be able to identify basic terms and concepts of combined arms warfare. You will also be able to describe the technological changes which occurred prior to and during World War I, as well as the effects of military doctrine.

- TASKS:** Demonstrate an understanding of the evolution of combined arms warfare from the beginning of the 20th Century through the end of World War I.
- CONDITIONS:** You are given information on the technology, practice, and doctrine of combined arms through 1918.
- STANDARDS:** Demonstrate understanding of the task by correctly answering 70% of the questions in a multiple-choice test.
- REFERENCES:** House, Captain Jonathan M., Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organizational, Combat Studies Institute, Research Study No. 2, US Government Printing Office, Washington D.C., August 1984.

## **LESSON 1**

# **COMBINED ARMS, 1900-1918**

## **OVERVIEW**

In this lesson you will first be introduced to basic terms and concepts of combined arms warfare. The instruction will include both explanations and examples. Secondly, this lesson will teach you about technological changes which occurred prior to World War I, and how military doctrine in 1914 did not adequately deal with the effect of these changes. Explanations and historical examples will be used to illustrate and clarify the subject matter. Thirdly, this lesson will focus on efforts to restore maneuver warfare after the trench stalemate developed in Europe.

# LEARNING EVENT 1

## PROLOGUE TO 1914

### Combined Arms

Combined arms refers to the cooperation or combination between the branches (infantry, artillery, cavalry). The concept of combined arms has existed for centuries, but the nature of the combination and the organizational level at which it occurred have varied greatly. The concern of commanders has gone from coordinating the separate actions of separate arms, to gaining cooperation between them. Finally, the focus has moved to combining their actions to maximize the effect of their various properties. Some form of use of combined arms is essential for survival on the battlefield.

The term "combined arms" often means different things to different people. Often times, the term is left undefined and vague. There are three related elements that help define "combined arms." Those three related elements include the following:

- The concept.
- Organization.
- Tactics and operations.

Each element, and how it relates to combined arms, is described in detail below.

**The Concept.** The combined arms concept is the basic idea that different arms and weapons systems must be used together to maximize the survival and combat effectiveness of each. For example, the strengths of one system must be used to compensate for the weaknesses of others. The arms and weapons included in this concept vary greatly between armies and over time. Today, however, the list of combined arms would include the following:

- Infantry (mechanized, motorized, airborne, air assault, light, and special or unconventional operations forces).
- Armor.
- Cavalry/reconnaissance.
- Artillery.
- Antitank forces.
- Air defense.
- Combat engineers.
- Attack helicopters.
- Some form of close air support.

Under certain circumstances this list may also include electronic warfare and, when authorized, nuclear and chemical fires. All combat support and combat service support elements are equally important if the force is to fight in a coordinated and sustained manner. Here, we will only briefly discuss the logistical aspects of combined arms.

Organization. Combined arms organization at whatever level (such as company, battalion, brigade/regiment), brings different arms and weapons systems together for combat. This may include both fixed, peacetime tables of organization, and ad hoc or task-organized combinations of elements in wartime.

Tactics and Operations. Combined arms, tactics and operations are the actual roles performed. Also included are the techniques applied by these different arms and weapons in supporting each other once they have been organized into integrated teams. This area is of most concern to professional soldiers. Yet, within this area, historical records and tactical manuals often neglect important details. Combined arms tactics and techniques at the level of battalion or lower are the most difficult aspects to examine historically. This is because combined arms tactics at battalion or lower are most subject to frequent changes in technology.

At this time, we cannot possibly consider the complexities these three elements bring to recent military history. However, we will be able to trace some recurring themes or problems in the recent conduct of combined arms warfare in the following armies:

- British.
- French.
- German.
- Soviet.
- United States.
- Israeli Defense Force (IDF) (since 1948).

We will identify general trends in the development of tactical and organizational concepts for integrating the different arms and weapons systems. We will consider division level and below. The trends in terms of proportions of different arms and levels at which those arms were integrated can be illustrated with a limited number of line and block charts. These trends should provide a historical framework and background of organization and employment of combined arms today. Before we go on to specific historical developments, we need to define various elements of tactical warfare and combined arms procedures.

#### Elements of Tactical Warfare

At the abstract level, tactical warfare may be considered a combination of three elements. Those three elements include:

- Mobility/Communications.
- Protection.

- Offensive power/Destructive firepower.

Each will be defined below.

Mobility. Mobility is the ability to maneuver and to concentrate or disperse forces over terrain.

Mobility is not absolute. It must be measured relative to:

- The difficulty of the terrain.
- The mobility of other friendly or enemy forces.

For a combined arms team, the least mobile element may determine the mobility of the entire force.

Mobility is important to the application of the principles of mass, maneuver, and offensive.

Protection. Protection means security against enemy surprise attack. Operational security provides a measure of protection against surprise. Protection also allows offensive maneuver or defense on the battlefield. Battlefield protection may be accomplished by the following:

- Using terrain defilade.
- Using defensive fortifications.
- Employing artificial means such as armor.

Offensive Power. Offensive power, or firepower, is usually necessary in order to impose one's will on the enemy. Firepower can overcome his protection.

The above three elements have interacted continuously throughout military history. The past century has been characterized by a vast increase in weapons power. This increase can only be overcome with great difficulty by a carefully designed combination of protective measures, mobility and offensive firepower. The most obvious example of this is the defensive system of World War I. That particular combination of firepower had to be countered by close coordination of infantry (when moving forward), fire support (offensive power), and armor (which theoretically combines all three elements). In World War I, defensive fortifications were by far the most important protective element. While this explanation of World War I is simplistic, the three basic elements of mobility, protection, and offensive power are present in most tactical equations.

### Combined Arms Procedures

Now we will look at the three elements (mobility, protection, and offensive power) at a more practical level. These three elements are combined two different ways. First, they are combined technically in the design and employment of individual weapons. Secondly, they are combined tactically in the combination of different weapons and arms. The concept and practice of combined arms is divided into two procedures, they are:

- Supplementary, or reinforcing combined arms.
- Complementary combined arms.

Each of these procedures is discussed in detail below.

Supplementary Combined Arms. This type of combined arms means increasing the effect of one weapons system or arm with other weapons and arms having similar effects. For example, the effects of mortars and artillery may reinforce or supplement each other in an integrated fire plan. Engineers may enhance the protection of armored vehicles by digging-in those vehicles with engineer equipment.

Complementary Combined Arms. By contrast, this type of combined arms has different effects or characteristics. Therefore, together they pose a more complicated threat, a dilemma for the enemy. For example, the defender should place a minefield so that it halts an enemy force at a point where observed artillery or antitank fires can attack that enemy as he clears the minefield. The defender has thus integrated the different weapon to provide a much greater effect than any one by itself could achieve. The resulting dilemma forces the enemy to accept casualties while clearing the mines or to seek a passage elsewhere.

Now, we will shift gears and focus on technological changes prior to 1914. We will examine their effects on the battlefield.

### Technological Changes

During the period of 1827-1897, two waves of technological change revolutionized the battlefield. We will cover each wave of technological change separately.

The First Wave. The most important innovation of the first wave of technological change was the introduction of the rifle. The muzzle-loading rifle replaced the smoothbore musket. Rifling and an improved seal between bullet and bore increased the velocity and accuracy of small arms fire. Their effective range was nearly 500 meters. During the American Civil War of 1861-1865, dense infantry formations in daylight provided lucrative targets for defenders armed with rifles. Both sides learned to spread out into skirmish lines when attacking. Defenders, for their part, had to dig in to reduce their own vulnerability to the attackers' rifle fire.

The muzzle-loading rifles used by most soldiers during the Civil War were already obsolete. This resulted from the Prussian Army's development of the breech-loading rifle. Unlike muzzle-loaders, breech-loaders could be reloaded in a prone position. This allowed infantry to remain under cover while firing repeatedly. Soon, fixed metallic-cased ammunition made loading even faster. By the time of the Franco-Prussian War in 1870-1871, most armies had adopted breech-loading artillery as well as rifles.

The first wave of technological change also included the introduction of the railroad and the telegraph. These inventions greatly increased the speed of communication, mobilization, and troop movement at the strategic and operational levels. However, at the tactical level, troops still maneuvered on foot or on horseback.

The Second Wave. The second wave of technological change came in the 1880s and 1890s. It included introduction of the following:

- Smokeless gunpowder.
- Magazine-fed repeating rifles.
- Recoiling and quick-firing artillery.

- Improved artillery fuzes.
- Machineguns.
- Internal combustion engines.

The above elements appeared in rapid succession. With the exception of the engine, these developments all increased the volume, range, and accuracy of fire. This placed the soldier in the open at a disadvantage compared to the soldier in prepared positions. General staffs were created to mobilize and deploy enormous armies using these new weapons. Although radiotelegraphs existed in the armies of 1914, the radio had not yet improved to a level where staffs could follow and direct events on the battlefield.

The overall effect of these two waves was to make cooperation and coordination between different units and arms absolutely essential. Without total coordination in the attack, the likely result for the attackers was defeat by defensive firepower.

#### Problems with Prewar Doctrine

Prior to 1914, most armies shared similar doctrine. The basic doctrine before WWI laid the primary emphasis of all armies on meeting engagements and hasty attacks. Thus, prewar training often neglected the defense. Looking back on the tactics employed, it is evident that there were a number of problems with prewar doctrine. First, the attacker assumed that he would have local numerical superiority over the defender. The problem here is the fact that the numbers of troops fielded in 1914 were very similar. This scenario also assumed that the enemy and friendly forces were operating in a vacuum, moving to contact against each other with their flanks open for envelopment. However, in practice the density of forces along the French, German, and Belgian frontiers in 1914 was great. Anyone seeking to maneuver to the flank was likely to encounter another unit, either friendly or enemy.

The most significant problem with prewar doctrine was that many professional soldiers considered their subordinates incapable of executing the tactics required. The kind of battle envisioned seemed to depend on two things: high morale and firm control. Officers in the French, Austrian, and Russian armies emphasized the psychological advantage of the attacker. Most professionals recognized that discipline and control would be extremely difficult to maintain under direct fire. The problem was compounded by the fact that most European units had a large number of reservists and poorly trained draftees. For example, a French first-line infantry company had a wartime authorized strength of 225 enlisted personnel. Fully 65% of those men were reservists or first year conscripts. Most reservists and conscripts lacked training and discipline necessary to conduct dispersed fire-and-movement tactics under heavy enemy fire. Professional soldiers argued that these troops would never stand up and advance if they were allowed to take cover. This belief led French, Russian, Austrian, and other officers to attack standing up in relatively dense formations. The officers recognized the risk they were taking, but felt that there was no other way to achieve the necessary rapid victory with untrained personnel.

**Integration and Coordination of Arms.** Pre-1914 armies organized combat arms into divisions and corps that bore a superficial resemblance to those of today. One major difference, however, was the absence of vehicles and electronics. By the end of the Napoleonic Wars, European armies had accepted the division as a wartime unit for combining infantry and artillery. Most cavalry was concentrated into



separate brigades, divisions, or even corps. By 1914, most armies agreed on the basic organization of an infantry division. They had the following characteristics:

- Most divisions contained 12 battalions of infantry, each with two machineguns either assigned or in direct support.
- Battalions were usually grouped into two brigades of two regiments each, (British regimental headquarters no longer had a tactical command function and remained in garrison).
- Division cavalry detachments were generally small because most functions of screening and reconnaissance were assigned to separate cavalry brigades or divisions.

The armies differed most in proportion and caliber of artillery included in the infantry divisions. The variations in structure created confusion and disagreement over the role of artillery and the importance of combined arms.

Next, we will consider cavalry, infantry, and artillery. In order to understand the doctrinal interrelationships of the different arms before World War I, some consideration of each arm is in order. First, we will look at cavalry.

Cavalry. The role of cavalry underwent changes due to increases in firepower. In the days before automobiles, cavalry had the greatest mobility of any of the combat arms. Traditionally, cavalry had three missions, they were:

- Reconnaissance and security before the battle.
- Shock action on the battlefield.
- Pursuit after the battle.

The increases in firepower during the late 1800s led many tacticians to suggest that shock action was no longer a feasible role except under rare circumstances. They argued that cavalry should be re-equipped as dragoons or mounted infantry. This would enable the mounted arm to continue its reconnaissance or security mission. At the same time, it could function as a highly mobile infantry that dismounted to fight after making contact with the enemy. Cavalry operated in this fashion during the American Civil War, the Boer War (1899-1902), and the Russo-Japanese War (1904-1905). By 1914, the British and German armies had equipped their cavalry with machineguns and trained them to fight dismounted when necessary.

Infantry. With respect to infantry, a rifle battalion before 1914 consisted of four companies of rifle-armed infantry plus two heavy machineguns. Such battalions did not have the grenades, mortars, and similar short-range, indirect-fire weapons that we today associate with "infantry." Armies somewhat neglected these weapons because of the specialized training they required. They also neglected the heavy machinegun and mortar because the pieces were too heavy to keep pace with advancing infantry. The firepower of breech-loading, magazine-fed rifle and machineguns had greatly outstripped the mobility and survivability of foot-mobile infantry. The only immediate remedy was to entrench. Attacking infantry was expected to forego protection in order to maximize its own firepower and mobility.

Artillery. Artillery was slow to adopt the new tactic of indirect fire. The traditional artillery tactic, perfected by Napoleon, was to concentrate the guns in a direct-fire role. They placed themselves between, or a few hundred meters behind the infantry units they were supporting. This tradition of direct-fire support meant that by 1914 all armies had standardized relatively light, highly maneuverable field guns with flat trajectories. The armies continued to employ this weaponry even after advances in technology had made accurate indirect firepower possible. Artillerymen knew about indirect-fire techniques but rarely practiced them because they seemed complicated and unnecessary.

The Boer War provided a glimpse into the future with trench systems and the skillful use of indirect-fire artillery. The German Army and the British Royal Artillery were impressed with the necessity for indirect fire, if only to protect the gun crews from enemy counterbattery fire.

However, the rest of the British Army believed in close direct-fire. The Germans (1909) increased their indirect-fire capability by converting one battalion in each division to 105-mm howitzers and by adding a battalion of 150-mm howitzers to each corps artillery. By 1914, Germany had 3,500 medium and heavy pieces. This included many howitzers and large siege mortars. France had only 300 modern guns larger than 75-mm.

Basically, World War I armies were unprepared for high-explosive artillery. They were not prepared for the devastating effects of massed, large caliber artillery fire on the battlefield. The experiments of Alfred Nobel and others gave all armies high explosive rounds that were much more destructive than the artillery shells of the nineteenth century.

Thus, at the outbreak of World War I, cavalry and artillery in most armies had not fully adjusted to the new technology. Infantry commanders doubted their ability to execute the relatively sophisticated fire-and-movement tactics of the day. Most significantly, none of the combat arms had trained for close cooperation with the others. This was an oversight that proved disastrous in 1914. The most obvious example of this was seen in the standard method of describing the size of an army in the field. Instead of counting combined arms divisions, or even single arm regiments, most officers described forces in terms of the numbers of rifles, sabers, and guns. These were the separate weapons of the three principal arms.

## Summary

Combined arms refers to the cooperation or combination between the branches (infantry, artillery, cavalry). Some form of combined arms integration is essential for survival on the battlefield. There are three related elements that help define combined arms: concept, organization, and tactics and operations. The elements of tactical warfare are a combination of mobility, protection, and offensive power. These three elements are present in most tactical equations. The concept and practice of combined arms is divided into two procedures: supplementary, or reinforcing, and complementary.

Between 1827-1870, two waves of technological change in the 19th century revolutionized the battlefield. During the first wave of change, the most important innovation was the introduction of rifled, breech-loading firearms. The first wave of technological change also included the introduction of the railroad and telegraph. The second wave of technological change came in the 1880s and 1890s. It included introduction of:

- Smokeless gunpowder.
- Magazine-fed repeating rifles.
- Recoiling and quick-fire artillery.
- Improved artillery fuzes.
- Machineguns.
- Internal combustion engines.

The overall effect of these two waves was to create cooperation and coordination between different units and arms.

Prior to 1914, most armies shared similar doctrine. There were a number of problems with prewar doctrine. The most significant problem was that many professional soldiers considered their subordinates incapable of executing the tactics required. In order to understand the doctrinal interrelationship of the different arms before World War I, some consideration of each arm (cavalry, infantry, artillery) is in order. The role of cavalry underwent changes due to increases in firepower. With respect to infantry, a rifle battalion before 1914 consisted of four companies of rifle-armed infantry plus two heavy machineguns. Artillery was slow to develop the new tactic of indirect fire. Basically, World War I armies were unprepared for high-explosive artillery. Thus, at the outbreak of World War I, cavalry and artillery in most armies had not fully adjusted to the new technology. Infantry commanders doubted their ability to execute the relatively sophisticated fire-and-movement tactics of the time. This was the situation leading into 1914.

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## Lesson 1

### Learning Event 1

## Practice Exercise

**Instructions** The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

1. Combined arms refers to the cooperation or combination between the branches (infantry, artillery, cavalry). There are three related elements that help define "combined arms." Which of the following is not one of the elements?  
  - ☐ A. The concept.
  - B. Offensive power.
  - C. Organization.
  - D. Tactics and operations.
2. Tactical warfare may be considered a combination of three elements. What are those three elements?  
  - A. Mobility, protection, defensive power.
  - B. Mobility, firepower, protection.
  - C. Mobility, firepower, defensive power.
  - D. Mobility, protection, offensive power.
3. The concept and practice of combined arms is divided into two procedures. Which type means increasing the effect of one weapons system or arm with the similar effects of other weapons and arms?  
  - A. Supplementary combined arms.
  - B. Complementary combined arms.
  - C. Offensive firepower.
  - D. Tactics and operations.

4. During the period of 1827-1890, two waves of technological change in the nineteenth century revolutionized the battlefield. During which wave of change were the railroad and the telegraph introduced?
- A. During the post-Civil War wave.
  - B. During the 1880-1890s wave.
  - C. During the first wave.
  - D. During the second wave.
5. During which wave of technological change were the following introduced?
- Smokeless gunpowder.
  - Magazine-fed repeating rifles.
  - Recoiling and quick-firing artillery.
  - Improved artillery fuzes.
  - Machineguns.
  - Internal combustion engines.
- A. During the first wave.
  - B. During the second wave.
  - C. During the post-Civil War wave.
  - D. During the Franco-Prussian War wave.
6. This arm's role underwent changes due to firepower. In the days before automobiles, it had the greatest mobility. What arm is described here?
- A. Cavalry.
  - B. Infantry.
  - C. Artillery.
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## **LEARNING EVENT 2**

### **WORLD WAR I**

#### **Technological Innovations**

Like all major wars, World War I accelerated the development of new technology. Changes were evident in artillery and communications. New weapons appeared as the result of effort to solve the

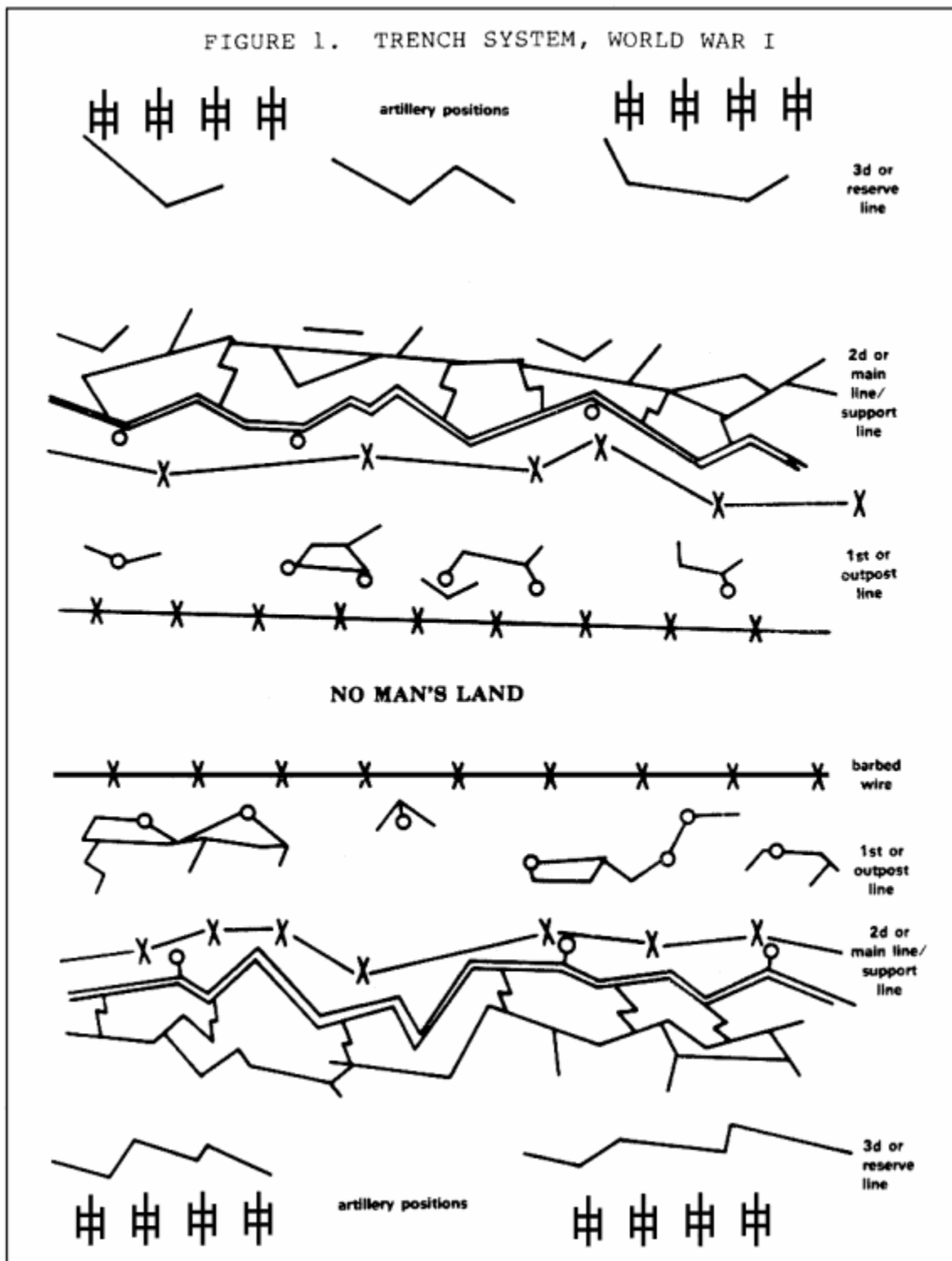
penetration problem. Artillery tactics are a major facet to consider when studying World War I. Next we will look at artillery techniques.

Artillery Techniques. In 1914, infantry attacks failed and trench warfare became the reality of combat (see [Figure 1](#)). Efforts to penetrate trench defenses relied most heavily on massed artillery fire. The British and the French rapidly gave up the idea of combining infantry maneuver with artillery fire. Instead, they concentrated on achieving overwhelming destruction in the preparatory fires. Many tactical commanders saw the new techniques as: "The artillery conquers; the infantry occupies." Artillery conquest was not easy. Everyone had expected a short war. Thus, few armies had sufficient supplies of ammunition and heavy artillery.

Techniques of Precision Indirect Fire. Adding to the problem mentioned above was the fact that most gunners had little experience in precision indirect fire. Many of the procedures that are common to artillerymen today were developed between 1914-1917. Those procedures include the following:

- Establishing forward observer techniques.
- Measuring and compensating for the effects of weather and worn barrels.
- Using ammunition from the same production lot to ensure that successful volleys fell in the same general area.

The first French regulation describing such procedures was not published until November 1915. The British Royal Artillery needed new maps of the entire area of Northeastern France before it could establish a grid system. The grid system served to aid in surveying battery locations and adjusting indirect fire. The newly developed air services of the belligerents had to provide aircraft for photographic mapping. They also had to provide aircraft and balloons for adjusting indirect fire. Improved radiotelegraphs allowed aerial observers to talk to the artillery fire controllers. These developments did not reach perfection until near the end of the war.



Coordinating Artillery with Infantry. Apart from the technical problems of indirect fire, there was the even greater problem of coordinating the infantry and artillery in an attack. The first deliberate attacks conducted by the British and French during late 1914 and early 1915 were particularly difficult to control. The reason being that both artillerymen and commanders lacked experience in indirect fire. The easiest procedure seemed to be the establishment of a series of phase lines. This concept placed artillery fire on the far side of a phase line while all infantry remained on the friendly side. Once the

commander directed artillery fires to shift forward past a new phase line, the troops could advance in relative safety.

Such phase lines encouraged commanders to ignore the terrain contours to their front and the possibilities for maneuver. There were no effective communications procedures that would allow the leading infantry units to talk to their supporting artillery.

Beginning with the battle of the Somme in July 1916, artillery was to provide a rolling barrage of shrapnel. It could advance at a steady rate of speed. The use of shrapnel instead of high explosives made it safer for the infantry to advance close behind the artillery barrage (about 100 meters). It was safer because the explosive effect of shrapnel was focused forward along the line of flight. However, shrapnel had almost no effect against well-prepared positions. The best it could do was force the defender to stay undercover during the assault. There was also no way for the infantry to adjust the rate at which the rolling barrage moved forward. The rigid forward movement of artillery fire often outran the heavy laden infantryman struggling across the shell pocketed battlefield. This allowed the defender time to leave his shelter and engage the attacker after the barrage had passed over a trench.

This problem with infantry-artillery coordination was only one aspect of the greater problems of command, control, and communications that plagued a World War I commander. The large scope of offensives and the scarcity of trained staff officers at junior headquarters meant that most operations were planned at the level of field army or higher. Given the crude nature of artillery procedures in the early stage of war, artillery planning and control were also centralized at a high level. This created a problem since the method of communication was extremely slow.

**Aerial Reconnaissance.** World War I was the first war to introduce significant air action. Military aviation developed at a tremendous rate during the war. However, it was still in its infancy in 1918. The publicity went to fighter pilots. Their primary mission was to achieve local air superiority. This allowed the primitive aircraft of the time to conduct their more basic functions of reconnaissance and artillery fire adjustment. Not until 1917 did the British and Germans officially recognize the possibility of ground attack by fighters in the forward area. Both sides considered the main effect of such an attack to be demoralization rather than destruction. By 1918, the first bombers with significant payloads appeared. In most cases reconnaissance, not bombardment, was the critical contribution of air power.

**Gas Shells.** The first attempt to break the trench defense was gas warfare. Although the French had experimented with various noxious gases on a small scale at the end of 1914, it was the Germans who first conducted major gas attacks. The first German test of gas took place in January 1915, at Lodz on the Russian front. Much of the chemical, however, failed to vaporize because of low temperatures. The first use on the Western Front was on 22 April 1915 at the Ypres salient. A surprise attack routed French colonial troops on a five-mile front, but the Germans were not prepared to exploit their success. They had no significant reserves available to advance before the French sealed the breach. Thereafter, each side found that primitive gas masks and uncertain weather conditions made the existing nonpersistent and early persistent agents difficult to successfully employ. When the British first used gas at Loos on 25 September 1915, the wind conditions were extremely calm. Thus, the gas moved too slowly or in the wrong direction along most of the front. The British troops advanced into their own gas, suffering more casualties than their opponents. The Germans, for their part, had problems with chemical warfare



on the Western Front. The prevailing winds came from the west, often blowing gases back in their faces. Gas warfare became only an adjunct. It was useful to degrade enemy effectiveness but not to achieve a penetration by itself. By 1917-18, the most common use of gas was to mix chemical and high explosive artillery shells during a preparatory fire. This was done in hopes of forcing the enemy out of his deep shelters where the gas settled.

**Increases in Mobility of Firepower.** Among the technological innovations of the times were improvements in the mobile firepower. This developed through equipment such as light automatic rifles, grenades, rifle grenade launchers, and tanks.

As early as 1915, the French began to issue new weapons to the infantry. These new weapons were the automatic rifle and the rifle grenade launcher. These, in addition to ordinary hand grenades, gave the French infantry mobile automatic firepower and short-range (up to 150 meters) indirect-fire capability. In 1916, France reorganized the infantry company to consist of a headquarters including communications and pioneer (combat engineer) personnel, plus four platoons of two sections each. Within these twelve-men sections hand grenadiers, rifle grenadiers, and riflemen were organized around the automatic rifleman as the base of fire. Three of these infantry companies, plus a company of eight heavy machineguns and a 37-mm gun in the headquarters, made up an infantry battalion that modern infantrymen can recognize as such. Other armies adopted similar armament and organizations. However, the Germans delayed until 1917. The German preoccupation with accurate fire by heavy machineguns made them reluctant to accept the relatively inaccurate light machineguns and automatic rifles. In desperation, frontline German infantry began to use captured French automatic rifles.

Thus, this reorganization of the French infantry around the automatic rifleman illustrates the improvements in the mobility of firepower. Another tactic that aided in the increase of firepower mobility was the use of the tank.

**Tanks.** The tank was originally designed as a special weapon to solve an unusual tactical situation, the stalemate of the trenches. Basically, the tank was intended to bring the firepower of artillery and machineguns across the swamp of No Man's Land. At the same time it would provide more protection than a purely infantry unit could carry. The sole purpose of this weapon was to assist the infantry in creating a penetration so that the cavalry could exploit the German rear. This purpose must be remembered in order to understand the shortcomings of early tanks. British, and especially French, heavy tanks had slow speeds, poor mechanical reliability, and great vulnerability to direct-fire artillery.

The French, British, and (with French equipment) Americans organized light tank units in 1918. The British "Whippet" tank was faster (7.5 miles per hour versus four miles per hour) than most heavy tanks. Light tanks were much easier to redeploy in secret from one sector to another, because they could be loaded onto trucks instead of moved by rail. Thus, technological innovations of the times increased the mobility and effectiveness of tanks. Not only did tanks increase in mobility, but trucks improved greatly in operational mobility by 1916.

**Trucks: Improved Operational Mobility.** The military motor vehicle developed from a few primitive cars in 1914, to thousands of large trucks by 1916. Although not a tactical weapon, the truck allowed the rapid movement of troops and supplies between widely separated points. As such, it increased operational mobility as significantly as had the railroad in previous generations. This made it possible

to mass suddenly and conduct a surprise attack at an unexpected point, or to move reserves to blunt a penetration. Trucks were also essential for stockpiling the ammunition and materiel needed for major offensives.

### Innovations in Tactics and Doctrine

During World War I, many changes in each army's tactics and doctrine took place. Here we will discuss the flexible defense of the German Army. We will also consider offensive tactics of German infiltration and Allenby's Second Armageddon.

Germany: Flexible Defense. While the British, French, and the Americans sought to solve the mystery of penetration, the Germans perfected their defenses against such a penetration. The evolution of German defensive doctrine was a system of flexible defense-in-depth. This not only hindered attack, but enhanced the capabilities of the German infantry.

Forward Trenches. At the beginning of the war, senior commanders on both sides emphasized a rigid defense of forward trenches. As the cost of taking ground increased, it seemed treasonous to voluntarily surrender land to an enemy attack. Many commanders believed that creating defenses-in-depth and allowing units to withdraw under pressure would encourage cowardice. Troops expecting a retreat may defend their positions only half-heartedly. German leaders gradually realized that massing their forces in the forward trenches was suicidal. The artillery bombardment before a French or British attack eliminated many of the defenders in those trenches. Thus increasing the possibility of enemy penetration.

Lines of Defense. As a solution to the failure of massing their forces in the forward trenches, Germany developed defensive lines. By 1917, the Germans had developed a system that included up to five successive lines. They were set up one behind the other in critical sectors. The first two or three lines were sited on reverse slopes wherever the terrain permitted. This complicated the task of adjusting allied fire on those trenches. It also meant that the attacking British and French infantry were out of sight and therefore out of communication with their own forces when they reached the German defenses. At the same time, if a German trench on the reverse slope were captured, it would be fully exposed to fire and counterattack from the German rear positions. The rearward trenches were beyond the range of enemy light and medium artillery. This made them more difficult to reduce.

Tactics. The tactics of the German defensive system emphasizes three principles. The three principles include:

- Flexibility.
- Decentralized control.
- Counterattack.

Such tactics did not evolve overnight. Many German commanders bitterly opposed the flexibility and decentralized control of the elastic defense. Nevertheless, the combination of flexibility, decentralized control, and counterattack at every echelon made the German defensive system almost invincible. We will discuss each of the above three principles in depth.

Flexibility. In terms of flexibility, the forward German trenches most exposed to bombardment contained few troops. They contained perhaps one battalion out of every four in the first two trenches. In contrast, the French put two thirds of every regiment in these forward lines. They had orders to hold at all costs. By 1916, the Germans had gone even further and had decided that their lines were useful shelters only during quiet periods. Once a bombardment began, the rearward German troops moved deep into bunkers. The forward outposts moved out of the trenches, taking cover in the nearby shellholes. The British and French artillery bombarded the deserted trenches until their barrage passed and their infantry began to advance. At that point, the Germans would come out of the shelters and open fire from the shellholes or from the remains of the trenches.

Decentralized Control. The second aspect of the German system was decentralized control. Squad and platoon leaders had considerable independence. They might defend or delay anywhere forward of the third, or main, defense line. The forward or "Front Battalion Commander" frequently directed the entire defense of a regimental sector. In the mature system of 1917-1918, this battalion commander had the authority to commit the remaining two or three battalions of his regiment in a counterattack at the moment he judged most appropriate. This exaggerated the difference in decision cycles. While the British and French attackers had to seek orders and reinforcements from their corps or army commander located miles to the rear, the defending German battalion commander could direct a regimental counterattack on the spot.

Counterattack. The above statement also pertains to the third element of the German defensive tactics. That is, counterattacks at every echelon to retake lost ground before the attacker could consolidate. In those areas that seemed most vulnerable to attack, a second echelon division was located behind every one or two front divisions. This second echelon was ready for counterattack if needed. Whenever a major offensive began, the German defenders sought to contain the flanks of the penetration by blocking positions. Counterattacks would then eliminate the resulting salient.

Infiltration and Penetration Offensive Tactics. While the Germans gradually perfected their system of defense, they also evolved infiltration and penetration offensive tactics. The organic firepower of foot-mobile infantry was dramatically increased during WW I by the development of trench mortars, grenade launchers, and light machineguns. Infiltration tactics emerged to take advantage of this firepower. First, we will look at the German infiltration offense.

German Infiltration Offense. The German infiltration tactics of 1918 can be summarized under four headings:

- Bruckmuller artillery preparation.
- Combined arms assault or storm battalion.
- Infiltrating or bypassing centers of resistance.
- Attack to disorganize the enemy rear.

Each will be described in detail below.

Bruckmuller Artillery Preparation. Col. George Bruckmuller developed German artillery techniques to a fine art. The essence of his technique was a carefully orchestrated short, but intense bombardment

designed to isolate, demoralize, and disorganize enemy defenders. Before each of the great offensives, Bruckmuller and his assistants held classes for junior leaders of both artillery and infantry. They would explain what would take place. The result was not only understanding and cooperation, but a much greater confidence among the infantry. Next, Bruckmuller allocated different weapons against different specific targets. For example, each trench mortar was given only 25-30 meters of enemy front to engage. Each artillery battery was assigned to suppress a specific enemy battery or to attack 100 to 150 meters of enemy positions. Bruckmuller avoided area targets, concentrating on such key points as:

- Artillery observation posts.
- Command posts.
- Radio and telephone centers.
- Rearward troops concentrations.
- Bridges.
- Major approach routes.

He carefully pinpointed all these targets on aerial photographs. The result was to cut enemy communications and isolate forward units. The effect was increased by surprise. Using the survey techniques developed in all armies during 1916-17, Bruckmuller was able to position and range his batteries in secret from points immediately behind the forward infantry trenches.

At the start of the German offensive on 21 March 1918, Bruckmuller began his bombardment with 10 minutes of gas shells to force the British to mask. This was followed by four hours and twenty-five minutes of mixed gas and high explosives. The preparatory fires shifted back and forth, so that the British did not know when the artillery was actually lifting for the infantry advance. Meanwhile, automatic rifle teams moved as close as possible to the British positions during the bombardment. When the Germans did advance, they moved behind a rolling barrage, further enhanced by intense fog. The combination of surprise, brevity, intensity, and carefully selected targets was unique.

The Combined Arms Assault or Storm Battalion. The combined arms assault or storm battalion was a union of all the weapons available after years of trench warfare, weapons which could be focused by a battalion commander. A typical assault battalion task force consisted of:

- 3-4 infantry companies.
- 1 trench mortar company.
- 1 accompanying artillery battery or half-battery of 77-mm guns.
- 1 flamethrower section.
- 1 signal detachment.
- 1 pioneer (combat engineer) section.

The regimental commander might attach additional machinegun units and bicyclists. The accompanying artillery pieces did not participate in the artillery preparation. They waited behind the

infantry, ready to move immediately. One of the principal tasks of the pioneers was to assist in the movement of the guns across obstacles and shellholes. Upon encountering a center of resistance, the infantry provided suppressive fire. The guns, mortars, and flamethrowers attempted to eliminate that resistance. Despite a specially constructed low carriage on some 77-mm guns, the result was a very high casualty rate among the exposed crews. However, the disorganized state of British defenses made such situations relatively rare.

**Infiltrating or Bypassing Centers of Resistance.** The essence of the German tactics was for the first echelon of assault units to bypass centers of resistance, seeking to penetrate into the enemy positions in columns or squad groups, down defiles or between outposts. Some skirmishers had to precede these dispersed columns, but skirmish lines and linear tactics were avoided. The local commander had authority to continue the advance through gaps in enemy defenses without regard for events on his flanks. A second echelon, again equipped with light artillery and pioneers, was responsible for eliminating bypassed enemy positions. This system of decentralized "soft-spot" advances was second nature to the Germans because of their flexible defensive experience. At the battle of Caporetto in 1917, the young Erwin Rommel used such tactics to bypass forward defenses and capture an Italian infantry regiment with only a few German companies.

**Attacks to Disorganize the Enemy Rear.** The final aspect of the German infiltration tactics was the effort to disorganize the enemy rear. The artillery preparation began by destroying communications and command centers. The infiltrating infantry also attacked such centers, as well as artillery positions. The British defenders who opposed the first German offensive of 1918 lost all organization and retreated thirty-eight kilometers in four days. Col. J.F.C. Fuller, one of the foremost British tank tacticians, observed that the British seemed to collapse and retreat from the rear forward. Major British headquarters learned of multiple German attacks on forward units just before losing contact with some of those units. The higher British commanders then ordered their remaining forces to withdraw in order to restore a conventional linear front.

The German spring offensives ultimately failed for a variety of reasons. First, due to lack of mobility to exploit initial successes. Second, lack of clear strategic objectives. As a result, the German Chief of Staff dissipated his forces in a series of attacks that achieved tactical success but no operational or strategic decision. Thus, the German offensive of 1918 used tactics and organization that could be described as blitzkrieg without tanks, disorganizing and demoralizing rather than systematically destroying the defender.

The German spring offensives of 1918 were the most obvious example of mobility returning to the battlefield. All armies in 1918 were better able to attack than they had been in the preceding three years. Beginning on 15 July 1918, the British, French, and Americans launched a sustained series of attacks that combined all the Allied innovations made during the war. Infantry units used renewed mobility and firepower. They also used tanks to precede them and suppress the enemy strongpoints. Airpower provided limited ground-attack capability plus reconnaissance before and during the battle. This air reconnaissance focused on antitank threats to the advancing forces. Artillery had become much more sophisticated and effective than in 1914. Most Important, the different weapons and arms had learned to cooperate closely, at least in carefully planned set-piece operations. Commanders could no

longer rely on one or even two arms. They had to coordinate every available means to overcome the stalemate of the trenches.

Despite all of this, the 1918 offensives in France never achieved a decisive result on the battlefield. The Germans were defeated more by sustained attrition and demoralization than by any decisive penetration and exploitation. One of the few cases in which a 1918 army penetrated a prepared defense and then exploited with conclusive results occurred in Palestine. Here, the British defeated Germany's ally, Turkey. This victory is known as the second battle of Armageddon. We will discuss this battle next.

Allenby and the Second Armageddon. The British commander, Sir Edmund Allenby, had steadily advanced from Egypt through Palestine. He advanced against a Turkish army with a German commander, Liman Von Sanders, and a few German units. The Turkish government had diverted its resources elsewhere, so in 1918 the British outnumbered the Turks two to one. Allenby further increased his advantage by a detailed deception plan that convinced the Turks that the British would attack at the eastern end of the front, in the Jordan valley. The actual attack was then conducted in the west, near the sea coast.

Allenby used all available elements, beginning with irregular troops in the enemy rear areas. On 17 September 1918, two days before the planned offensive, the famous T. E. Lawrence and Prince Feisal of Arabia conducted a wave of attacks on Turkish rail lines. This was done in order to divert attention and isolate the battlefield. The Royal Air Force also harassed Turkish lines of communications for days. At 0430 on 19 September, the British infantry began to move forward behind a 15-minute artillery barrage. This short preparation achieved surprise and avoided tearing up the ground. Moreover, the long delays in assembling troops and supplies prior to the offensive had enabled the British and Commonwealth infantry to train to high standards of flexibility. Unlike the campaigns in France, exploitation forces did not have to wait for authority to engage. Instead, one Australian and two British cavalry divisions began the battle closed up tightly behind the assaulting infantry. Their exploitation objectives were already designated. Because of this decentralized control, the 4th Cavalry Division completed its passage of lines. They began the exploitation within four hours of the initial assault.

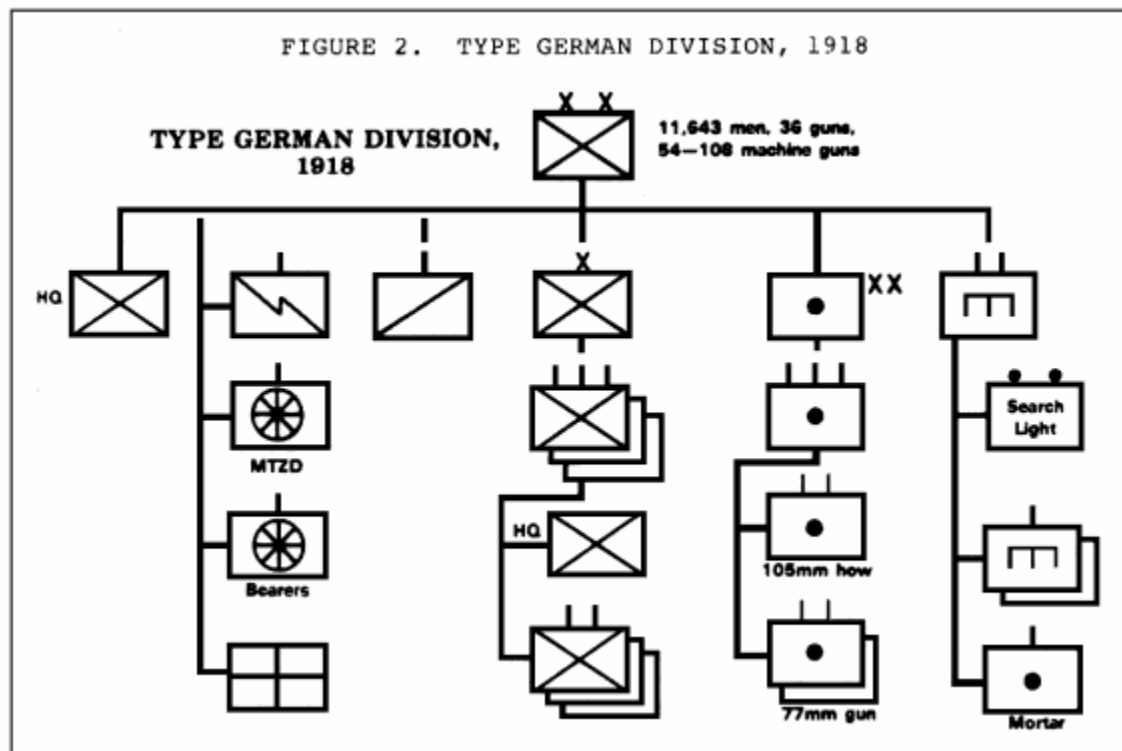
The primary objectives of the campaign were the railroad junctions at El Afule and Beisan, 40 miles behind the front. A secondary objective was Nazareth, the German-Turkish headquarters. Seizure of these points would cut off the forward Turkish units from their supplies, commanders, and route of retreat. The key was to move cavalry through the passes of the Mount Carmel heights so rapidly that the Turks could not reach to block the passes. This was accomplished on the evening of the first day. The next morning, a brigade of the 4th Cavalry Division encountered a reinforced Turkish infantry battalion marching forward in a belated effort to block the pass at Musmus. A combination of armored car machinegun fire and horse cavalry lances captured this battalion before it ever deployed. Twenty-five hours after the offensive began, another British cavalry brigade surrounded the brigade occupying Nazareth. The brigade had been isolated and harassed by air attacks. Although the German commander escaped in the confusion, the British captured all the documents in the enemy headquarters. The Turkish 7<sup>th</sup> and 8<sup>th</sup> Armies, surrendered en masse, and only the November armistice ended the British pursuit.

The significance of the Second Armageddon was threefold.

- First, it represented a rare example of making the transition from penetration to exploitation and pursuit before the defender could react. The key to this success was the fact that the exploitation force did not wait for permission from higher headquarters. It was committed on the decision of division commanders and in execution of a previously arranged plan.
- Second, Allenby used all his weapons and units in a flexible and integrated manner that was matched in World War I only by the Germans.
- Third, the Second Armageddon influenced an entire generation of British cavalry officers, who considered it the model of a mobile, deep battle. After the frustrations of the trench stalemate in France, the exploitation in Palestine seemed a dream come true. When these cavalry officers became armor commanders, they stressed the need for mobile, lightly armored vehicles. As a result, one-half of the British armored force in 1939 was equipped with inadequate guns and armor and was not prepared to cooperate with the other combat arms.

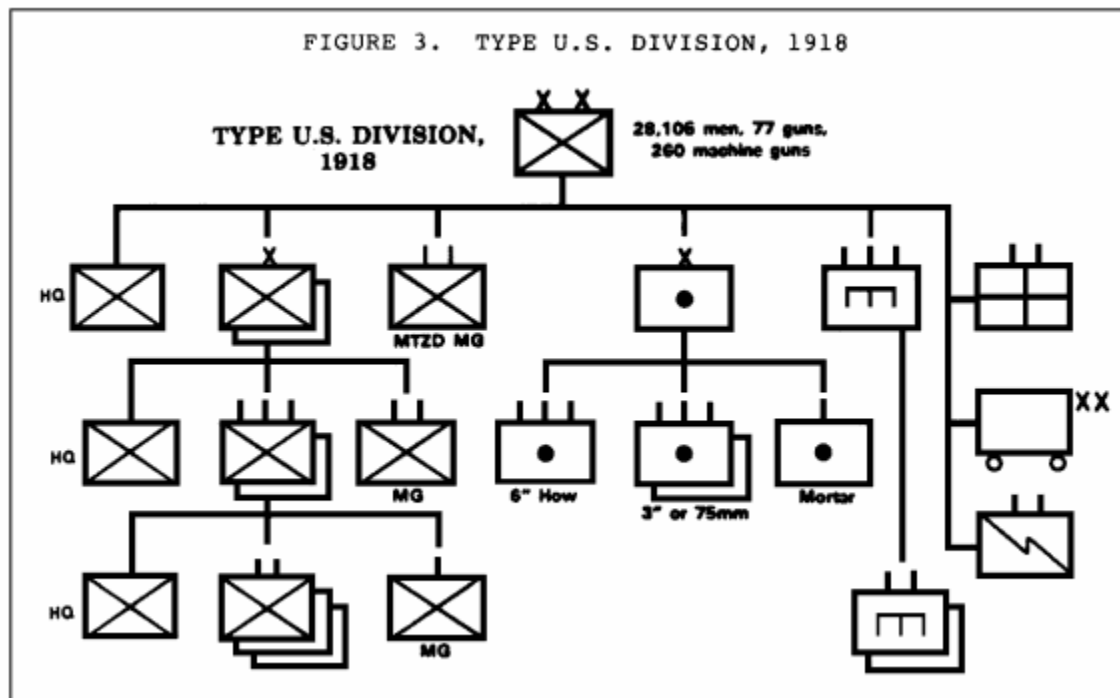
Organization of Infantry Divisions. The organization of the divisions differed greatly between the US and European armies. The main reason for this difference was manpower. The US division was larger than divisions in the other armies. Because of this difference, the divisions were organized into differing structures. The US was organized into a "square" division structure while the Europeans were organized into a "triangular" division structure.

The European Divisions. The organization of a square division structure calls for four brigades of four regiments each. Both the French and the Germans found that the square division structure was unsuited to their positional warfare. Given the broad frontages involved in this type of war, no European power had enough manpower and units to deploy divisions with two regiments in the first line and two in the second. However, if three regiments were in the first line and the fourth regiment served as a general reserve, one of the two infantry brigade commanders was superfluous. So, the Germans left one brigade commander in control of all infantry. By 1916, both the French and the Germans had reduced the number of infantry regiments in a division from four to three. Thus, creating a triangular division structure (see [Figure 2](#)). The British had entered the war with a three-brigade structure. However, they eventually followed suit by reducing the brigade from four infantry battalions to three when manpower shortages became acute. This type of organization had the added advantage of increasing the proportion of artillery and other branches to infantry. Thus, a 1914 French infantry division consisted of 87% infantry, 10% artillery, and 3% support elements. The 1918 version had a proportion of 65% infantry, 27% artillery, and 8% support.



The US Division. The United States Army not only insisted on a four-regiment structure, but actually increased the size of rifle companies during 1917. Thus, the US division rested on square division structure (see [Figure 3](#)). The US division varied in size from 23,000 to over 28,000 men. They were considered gigantic compared to the European divisions who were down to 8,000 men or fewer. In fact, the French and British commanders who controlled American divisions refused to use them according to their design. Instead, they pushed them into line with three regiments forward and the fourth either in second echelon or in corps reserve. In one instance, the 42nd US Infantry Division assumed the defense of a sector previously occupied by an entire French corps of three divisions. In principle, however, the American design was intended to provide for offensive and defensive operations despite the high casualties of trench warfare. The apparent intent was that an American brigade commander, with one regiment in contact and the second behind it, could leapfrog his regiments to sustain an offensive almost indefinitely. Thus, the decision-cycle time necessary to relieve exhausted assault troops would be cut. Unlike all higher commanders on the Allied side, this colonel or brigadier general had only a few aides and was free to command from forward locations. The only reserve available to the division commander was the two-battalion combat engineer regiment. This was frequently pressed into service as infantry.





Weapons and Artillery. The rapid development of weapons and tactics during World War I significantly changed tactical organizations. The number of automatic weapons in an infantry division rose from a norm of twenty-four heavy machine guns in 1914 to the following totals in 1918:

- Germany, 144 automatic rifles and 54-108 machine guns.
- France, 216 automatic rifles and 72-108 machine guns.
- Britain, 192 automatic rifles and 64 machine guns.
- Italy, 288 automatic rifles and 72 machine guns.
- United States, 768 automatic rifles and 260 machine guns.

Artillery developed almost as dramatically, although most of the additional guns were concentrated in non divisional units. Their numbers varied depending on the mission of the division being supported. Though the Americans differed with their allies about many details, all participants came away from World War I with certain impressions in common. Some of the general feelings about World War I include:

- The tremendous problems of logistics and manpower.
- The necessity for detailed planning and coordination.
- The difficulty of advancing, even when all arms worked closely together.

Under carefully planned and controlled circumstances, the Allies had been able to combine all weapons systems to maximize the effects of each. Of all the belligerent systems for achieving this combination, the Germans proved to be most willing to adapt to new weapons and tactics.

## Summary

World War I accelerated the development of new technology. Changes were evident in artillery and communications. New weapons appeared as the result of the penetration problem. In 1914, infantry attacks failed and trench warfare became the reality. The most obvious means of creating a penetration was with massed artillery fire. Two problems existed in 1914:

1. Everyone had expected a short war. Thus, few armies had sufficient supplies of ammunition and heavy artillery.
2. Most gunners had little experience in precision indirect fire.

Due to these problems, many of the procedures common to artillerymen today were developed between 1914-1917. Those procedures include:

- Establishing forward observer techniques for close coordination of indirect fire.
- Measuring and compensating for the effects of weather and worn barrels.
- Using ammunition from the same production lot to ensure that successful volleys fell in the same general area.

Another problem that existed was the problem of coordinating infantry and artillery in an attack. During late 1914 and early 1915, attacks by the British and French were difficult to control because commanders and artillerymen lacked experience in indirect fire and reliable communications. Thus, the development of phase lines.

World War I was the first war to introduce significant air action. Military aviation developed at a tremendous rate, but it was still in its infancy in 1918. Gas warfare was also first introduced during World War I. It was used in the first attempt to break the trench defense. Also among the technological innovations of the times were improvements in the mobility of firepower. This was developed with equipment such as light automatic rifles, grenades, rifle grenade launchers, and tanks. The introduction of trucks improved operational mobility.

During World War I, many changes in the army's tactics and doctrine took place. German defensive doctrine evolved into a system of flexible defense-in-depth. This not only hindered attack, but developed the capabilities of the German infantry. The tactics of the German defensive system emphasized three principles: flexibility, decentralized control, and counterattack. While the Germans gradually perfected their system of defense, they also developed infiltration and penetration offensive tactics. The German infiltration tactics of 1918 included:

- Bruckmuller artillery preparation.
- Combined arms assault or storm battalion.
- Infiltrating or bypassing centers of resistance.
- Attacks to disorganize the enemy rear.

By 1918, the organization of infantry divisions differed greatly between the US and European armies. The main reason for this difference was due to available manpower. The US division contained far

more men than the divisions of the other combatants. Because of the difference, the divisions were organized into differing structures. The US was organized into a "square" division structure while the Europeans were organized into a "triangular" division structure. Though the Americans differed with their allies about many details, all participants came away from World War I with certain impressions in common. Some of the general feelings about World War I include:

- The tremendous problems of logistics and manpower.
- The necessity for detailed planning and coordination.
- The difficulty of advancing, even when all arms worked closely together.

## Lesson 1

### Learning Event 2

## Practice Exercise

**Instructions** The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

1. In 1914, infantry attacks failed and trench warfare became the reality of combat. The most obvious means of creating a penetration was with massed artillery fire. Various problems existed. Which of the following was a problem that existed in 1914?
  - ☐ A. Everyone had expected a short war. Thus, few armies had sufficient supplies of ammunition and heavy artillery.
  - B. Most gunners had little experience in precision indirect fire.
  - C. Coordinating infantry and artillery in an attack.
  - D. All of the above.
2. Technological innovations developed during World War I. Which of the following did not develop during this time?
  - A. Nuclear warfare.
  - B. Firepower mobility - light automatic rifles, grenades, rifle grenade launchers, and tanks.
  - C. Gas warfare.
  - D. Military aviation.
3. During World War I, the evolution of German defensive doctrine was a system of flexible defense-in-depth. The tactics of the German defensive system emphasized three principles. What were they?
  - A. Flexibility, centralized control, and counterattack.
  - B. Rigidity, centralized control, and counterattack.
  - C. Flexibility, decentralized control, and counterattack.
  - D. Rigidity, decentralized control, and counterattack.

4. Which army division, in 1918, was organized into a "square" division structure?
- A. United States.
  - B. German.
  - C. French.
  - D. British.

## LESSON 2

# COMBINED ARMS, 1919-1945

## INTRODUCTION

### TASK DESCRIPTION:

Upon completion of this lesson, you will be able to describe the evolution of combined arms warfare between the World Wars. This will include the factors which retarded development and important innovations for each of the major armies. You will also be able to describe the evolution of combined arms warfare during World War II.

- TASKS:** Demonstrate an understanding of the evolution of combined arms warfare from 1918 through 1945.
- CONDITIONS:** You are given information on the technology, practice and doctrine of combined arms from 1918-1945.
- STANDARDS:** Demonstrate understanding of the task by correctly answering 70% of the questions in a multiple-choice test.
- REFERENCES:** House, Captain Jonathan M., Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organizational, Combat Studies Institute, Research Study No. 2, US Government Printing Office, Washington D.C., August 1984.

## LESSON 2

# COMBINED ARMS, 1919-1945

## OVERVIEW

In order to understand the progress of combined arms warfare between world wars, information on factors which retarded military developments will be presented in [Learning Event 1](#). Descriptions of the most important innovations in combined arms doctrine of the interwar period will follow. In [Learning Event 2](#), the major trends and innovations in combined arms warfare during World War II will be discussed.

## LEARNING EVENT 1

### THE INTERWAR PERIOD

No major army entered World War II with the same doctrine and weapons that it had used 20 years before. During the interwar period, most professional soldiers realized that some change was necessary if they wanted to perform better on the battlefield. Particularly changes in the penetration and exploitation operations that had proven so difficult during World War I. The armies differed markedly in their solution to those problems. Instead of a simple choice between trench warfare and blitzkrieg, each army was faced with a variety of possible changes. This reflected a series of degrees of modernization between the two extremes. In many cases, the choice was determined by social, economic, and political factors more than by the tactical concepts of senior officers.

#### Factors Which Retarded Military Change

Because of this tactical variety between world wars, we must examine the doctrine and organization of each of the major powers prior to entering World War II. First, we need to examine some common factors that hampered military change in most nations. They are:

- Anti-military feelings.
- Tight defense budgets.
- Technology.
- Confusion in terminology.
- Advocates of change who did not always speak persuasively.
- Opposition of the more traditional combat arms.

Each of these factors will be discussed in detail.

**Anti-Military Feelings.** The first of the factors which retarded military change was a general revulsion against warfare and all things military. After decades of peacetime preparation and years of bloodshed, few people in Europe or America were interested in further military expenditures or experiments with new weapons and tactics. Even after most armies concluded that trench warfare was a special kind of combat that would not necessarily recur, the general public and political leadership were unwilling to risk another war. In 1928, 15 nations signed the Kellogg-Briand Pact, renouncing the use of war except in national self-defense. During the '20s and '30s, a series of international conferences attempted to limit military and naval arms and equipment. These conferences ultimately failed. However, professional soldiers still felt it was fruitless to justify new tanks and aircraft in a social and political environment that might outlaw such weapons at any time.

**Tight Defense Budgets.** During the first fifteen years of peace, extremely tight defense budgets reflected the public distaste for warfare. The victorious armies had huge stockpiles of 1918-model equipment and ammunition. These stockpiles had to be used up at peacetime rates before major new expenditures could be justified. Thus, during the early 1930s the US Army spent more money

researching means to preserve ammunition than to develop new weapons. However, just as the stockpiles were consumed, the Great Depression caused even tighter defense budgets. This hampered development of tanks, aircraft, and other new weapons. The Germans had been deprived of their weapons by the Versailles Peace Treaty of 1919 and could therefore start fresh. To some extent, the German tactical successes of 1939-'42 were due to the fact that the German tanks and other vehicles were produced early enough to allow extensive experimentation and training before the war. In contrast, the British and French had few modern weapons with which to train until the eve of World War II. Nations with a smaller industrial base, such as Japan and Italy, could not fully compete in the arms race.

Technology. A third factor which affected military change was technology. It did so in two ways. First, rapid changes in technology made government even more reluctant to invest in existing designs that would soon be outmoded. Second, it was often difficult to determine exactly how this new technology affected the tactics of 1918. Equipment designed to fulfill these tactics might be unsuitable for different functions and concepts. New designs appeared without appropriate tactical concepts to accompany them.

Confusion Terminology. There was also considerable confusion in terminology. Both advocates and opponents of mechanization often used the term "tank" loosely. It could mean not only an armored, tracked, turreted, gun-carrying fighting vehicle, but also any form of armored vehicle or mechanized unit. Such usage confused historians, making it difficult to determine whether a particular speaker was discussing pure tank forces, mechanized combined arms forces, or mechanization of infantry forces. Another term often confused was "mechanization". Any use of the gasoline engine for warfare could be termed mechanization. However, this term usually describes the use of armored tracked combat vehicles. By contrast, "motorization" describes the use of motor vehicles not intended for combat, but which may improve logistics and mobility of the battlefield. Prior to World War I, all nations relied on a pool of civilian horses as transportation in case of war. With the rise of motor vehicles during the 1920s, this supply of civilian animals declined to the point where armies had to base their transportation planning on motor vehicles. Thus, motorization was often seen as an easier, cheaper, less revolutionary change than mechanization.

Advocates of Change - Little Persuasion. The fifth factor which affected military change was the fact that advocates did not always speak persuasively or with one voice, even when their terms were understood. Even those reformers with a clear vision of mechanized, combined arms war were often so extreme in their statements that they alienated commanders and politicians who set military policy. In the French and Soviet cases, political issues retarded the development of new mechanized formations. Proponents of strategic airpower, such as Emilio Douhet and William Mitchell made exaggerated claims that retarded the development of the tactical combined arms team. Intent on achieving independence from army control, the airpower advocates vigorously opposed tactical air support and air-ground cooperation. They considered the targets involved to be too minor to justify risking aircraft. These air enthusiasts had limited success as publicists, influencing politicians with an apparently cheap, efficient solution to defense needs. As a result, funds were diverted from valuable training or ground-weapons development to building air forces that were not in proportion to their respective armies. This



led to the sixth and final factor that affected military change - the opposition of the more traditional combat arms.

**Opposition of Traditional Combat Arms.** Many commentators have blamed such opposition for thwarting or retarding the development of mechanized warfare. The tank and aircraft were not the only weapons systems that developed between the world wars. The older branches had genuine needs that competed with new weapons for funding and for roles in the combined arms team. The infantry had legitimate requirements for increased organic firepower and for antitank and antiaircraft defenses. They also had legitimate requirements for some form of armored support to assist it in the deliberate attack. The artillery needed the same mobility as the armored forces in order to support those forces in the breakthrough. Fast moving mechanized formations required more flexible communications and fire support. Combat engineers had become preoccupied with maintaining lines of communication during the positional warfare of 1914-'18. These men were more important than ever when mechanized units increased the problems of mobility and countermobility on the battlefield. The rest of this learning event will focus on the development of mechanized formations and tactics. Such developments must be viewed within the context of a more traditional mass army.

### Combined Arms Innovations

Next, we will examine combined arms innovations and doctrine for each of the major armies. We will consider Great Britain, Germany, France, the Soviet Union, and the United States.

**Great Britain.** In 1918, Great Britain led the world in both armored equipment and armored doctrine. However, the British Army gradually lost its lead, not only in armor, but in most areas of tactical progress. In addition to the six common factors previously discussed, there were other special obstacles that prevented British innovation. The most commonly cited obstacle was traditionalism within the British Army. The strong unit identity of the British regimental system discouraged radical changes within the traditional arms and services. Another problem that limited change was that of worldwide imperial defense.

Britain drifted in the area of mechanization. Developments in the more traditional arms were equally mixed. Cavalry merged into the mechanization process, although too late to learn all the mechanical and tactical differences between horses and light armor. Infantry was saddled with inappropriate weapons throughout the 1920s. Between 1936 and 1939, new equipment and organization finally restored the firepower and mobility of British infantry, but at a price. By 1939, the British Army had lost much of its pioneering advantage in both equipment and technology. Outside of the infantry battalion, cooperation between different weapons systems and arms was little better than it had been in 1914.

**Germany.** France, Britain, and the United States, the victors of 1918, had a natural tendency to employ at least some of the materiel and doctrine of 1918 during the immediate postwar years. A defeated Germany, by contrast, had every reason to embrace new tactics and weapons.

Even if it wished to, Germany could not reproduce the mass armies and static defenses of 1914-'18. The Treaty of Versailles limited the German Army to 100,000 long-tour professional soldiers. The same

treaty forbade Germany to possess tanks, poison gas, combat aircraft, and heavy artillery. German doctrine led technological development, in contrast to the situation in other armies.

The German Military Tradition. Since the 1860s, the German tradition of tactics and operations favored outflanking and encircling the enemy. If that failed, the army would breakthrough and disrupt the enemy's organization. This German tradition meant two things:

- First, the Germans believed in concentrating all their resources on a relatively narrow front for breakthrough.
- Second, this concentration of forces required the careful integration of all weapons and arms at battalion level or below to overcome the enemy's defenses.

Another part of the German military tradition was decentralized execution. German commanders moved forward to observe and make tactical decisions for themselves. This enabled them to communicate their decisions to subordinates much more rapidly than was possible from a command post in the rear. This decentralization was facilitated by a mutual understanding among German leaders. It was an understanding based on common doctrine such as the Command and Combat of the Combined Arms. Aware of both a commander's intention and the common doctrine, subordinate leaders could execute that intention in accordance with that doctrine. Thus reducing the need for detailed instructions from higher echelons. This decentralization and rapidity of decision making were ideally suited to any form of fluid combat, including mechanized operations.

Mechanization. Among the German proponents of mechanization, Gen. Heinz Guderian was probably the most influential. Guderian proposed that it was useless to develop just tanks, or even to mechanize parts of the traditional arms. What was needed was an entirely new mechanized formation of all arms that would maximize the effects of the tank. In 1931, Guderian became the commander of the 3rd Motor Transport Battalion. Using dummy equipment (because of the limitations of the Versailles Treaty), this battalion was an experimental "mechanized" force. It consisted of one company each of the following:

- Motorcycles.
- Armored cars.
- Tanks.
- Antitank guns.

It was a similar, small-scale demonstration using some of the first light tanks produced in Germany that impressed Hitler in 1934. This eventually led to the development of the Panzer division.

Panzer Division. In 1934, experimental maneuvers for a full panzer division took place. In 1935, Hitler formed the first three such divisions on a permanent basis. The German panzer division of 1935, is shown in [Figure 4](#). As in other armies, Germany's first effort at armored organization included a tremendous number of tanks (561 per division). Otherwise, this organization showed considerable balance in numbers and types of weapons. The brigade and regimental headquarters were trained to control cross-attached units and weapons systems. Such a system required considerable training and put great stress on the maintenance and logistical support of the cross-attached elements. However, this



distance would give France time to mobilize. In reality, the Maginot Line did not prove beneficial to the French Army.

In general, the French doctrine viewed combined arms as a process by which all other weapons systems assisted the infantry in its forward progress. Tanks were considered to be "a sort of armored infantry," subordinated to the infantry branch. The subordination of tanks to infantry impeded the development of roles for armor other than close infantry support. However, Chief of Staff Maxime Weygand took significant steps toward motorization and mechanization during the early 1930s. Five, ultimately seven, infantry divisions became motorized. One brigade in each of four light cavalry divisions was equipped with half-tracks and armored cars. In 1934, Weygand continued the trend towards armored cavalry by forming the first "light mechanized division". This division, with its combination of reconnaissance, light tanks, trucked infantry, and towed artillery, was remarkably similar to the German Panzer division being developed at the same time. However, in 1934, the developments of the French Army in the area of mechanization was nearly aborted by the writings of Charles de Gaulle. De Gaulle's book (Towards the Professional Army) jeopardized the efforts of Weygand and set extremely high standards for the armored division.

France entered World War II with a mass army that would require months to organize and train. Their new mechanized formations and modern equipment had been fielded too late for proper testing, evaluation, and training. Like those of the British, French armored units were specialized either for cavalry missions or deliberate breakthrough attacks. They were not balanced for all types of mobile operations. Given these limitations, the French doctrine of slow, methodical offensive action appeared as the only course that would allow them to attack at all. Unfortunately, the Germans did not wait for the French to plan and execute such attacks.

The Soviet Union. The Soviet Union's mass development after World War I differed from that of the rest of Europe for two reasons.

- First, the Red Army was created in 1918 after the Bolshevik revolution and lacked the traditions and training of other major armies.
- Second, the Russian Civil War of 1918-'21 was markedly different from most of the European campaigns of World War I. Because of the vast distances and weak armies involved in the Civil War, penetration and encirclement were no longer difficult, and field maneuver was the rule.

Like Hitler's Germany, but unlike France and Britain, the Soviet Union was openly interested in offensive warfare as a means of spreading its political doctrines.

Deep Battle - Tukhachevsky's Doctrine. During the 1920s and early 1930s, a group of Soviet officers led by Mikhail Tukhachevsky developed a concept of "Deep Battle." It employed conventional infantry and cavalry divisions, mechanized formations, and aviation in concert. These efforts culminated in the Field Regulations of 1936. Instead of regarding the infantry as the premier combat arm, Tukhachevsky envisioned all available arms and weapons systems working together in a two-part battle. First, a massed, echeloned attack on a narrow front would rupture the defender's conventional infantry-artillery-antitank defense. The attacker's artillery and mortars would suppress defending artillery and especially defending antitank guns. Moving behind the artillery barrage and a few meters in front of the

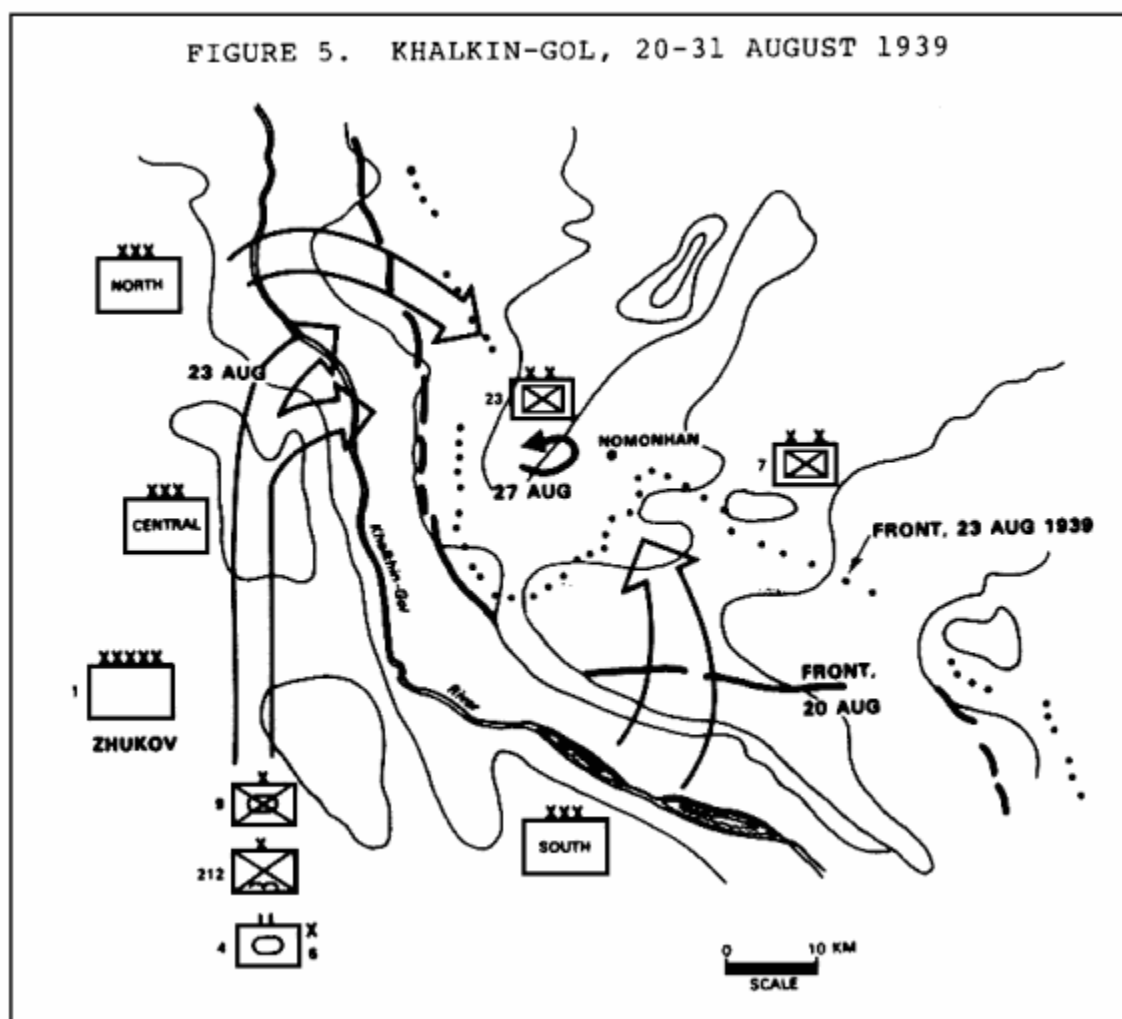
infantry, the tanks could safely crush wire, overrun machinegun posts, and reduce other centers of enemy resistance. Once the enemy's forward defenses were disrupted, accompanying tanks would not be tied strictly to the infantry rate of advance. They could take advantage of local opportunities to penetrate and attack enemy reserves, artillery, headquarters, and supply dumps. This action would duplicate on a smaller scale the second part of the battle, which was to disrupt and destroy the enemy by deep attacks. "Mobile groups," composed of cavalry, mechanized formations, or both, would exploit their mobility advantage to outflank the enemy or develop a penetration in order to reach the enemy rear areas. The object of a deep attack was to attack the entire depth of the enemy defenses simultaneously. The following was to be employed:

- Long range artillery fires.
- Deep penetrations by mobile forces.
- Bombing and parachute attacks of key points.

In addition, smoke and deception operations would distract the enemy from the attacker's real intentions.

This Soviet force structure had its problems. First, the planned armored force was so ambitious that not all units could be fully equipped. The average Soviet citizen had little experience with motor vehicles, thus maintenance was a problem. Soviet radios were notoriously unreliable, which made command and control difficult. The Soviet armored force needed several more years of experimentation and training before it could realize its full potential. In the meantime, the government executed Tukhachevsky and his officer corps. Thus, very few advocates for large mechanized formations existed.

Zhukov's Khalkin-Gol Campaign. The battlefield failures in Poland and Finland in 1939-40 promoted a series of reforms in organization, leadership, and tactics that slowly began to improve Soviet military ability. The only successful Soviet campaign of this period was in the undeclared war against Japan. Stalin was concerned about Japanese expansion in Asia. He placed Gen. Georgi Zhukov in total command of the forces there. Hostilities with the Japanese Army erupted in the summer of 1939 on the Khalkin-Gol River of Manchuria (see [Figure 5](#)).



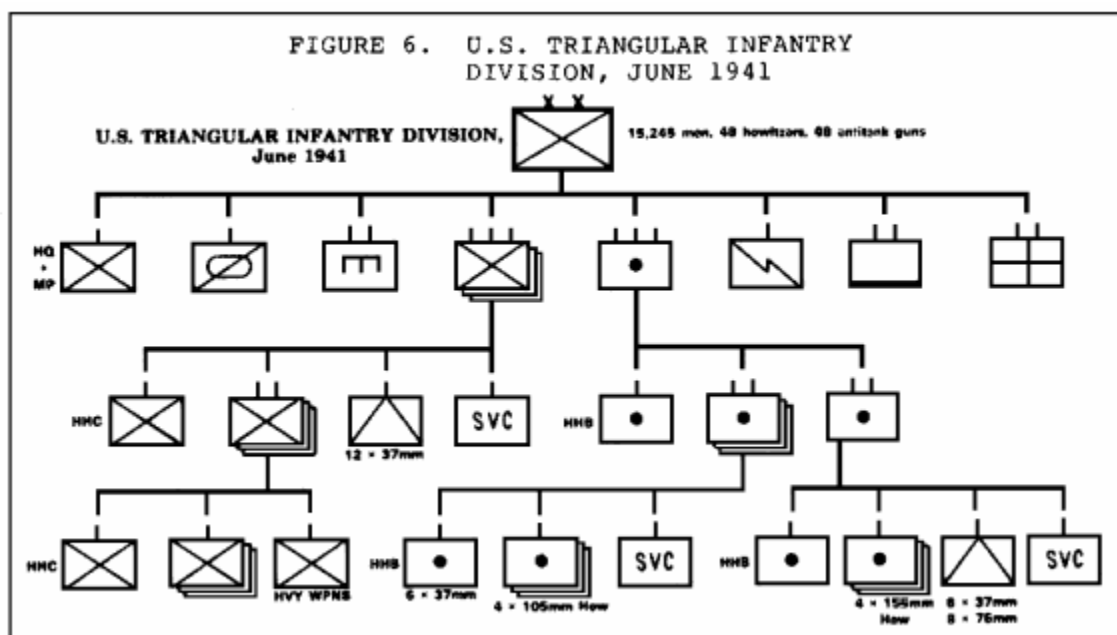
The Japanese decided to fight the Soviets in this remote area on the border between Japanese-occupied Manchuria and Soviet-dominated Outer Mongolia. They believed that the Soviets would be unable to concentrate and supply a major force there. To the surprise of the Japanese, the Soviets massed 469 light tanks, 426 other armored vehicles, 679 guns and mortars, and over 500 aircraft, all supplied by thousands of trucks. Zhukov organized a classic double envelopment between 20 and 31 August 1939. First, a series of Soviet probing attacks in the center fixed the Japanese defenders. The Soviet artillery concentrated against strongpoints found by these probes. Then, the two Soviet flanks pressed forward, encircling the Japanese 23rd Infantry Division and part of the 7th Infantry Division. The Soviet attacks used tank and machinegun direct fire. They coordinated artillery fire to protect their advancing infantry. In some cases, the infantry rode on the outside of armored cars, reducing the time needed to close with the enemy, but exposing both vehicles and riders to concentrated enemy fire. On the other hand, some Soviet commanders were unimaginative in executing Zhukov's plan, making repeated frontal attacks instead of bypassing Japanese resistance. Still, Khalkin-Gol provided an excellent trial of Soviet doctrine on the very eve of World War II. Zhukov and his subordinates naturally rose to prominence during that war.

The United States. Despite its unique division structure, in 1918 the US Army was heavily under the influence of French tactical and staff doctrine. Therefore, the immediate postwar doctrine of the US

Army paralleled that of the French Army. For example, the United States subordinated tanks to the infantry branch. Their view of combined arms was also very similar to that of the French Army. However, this rigid view of combined arms did not last for long. In 1920, Brig. Gen. Fox Conner decided that French warfare was inappropriate for operations on the American continent, the expected arena of future American wars. Conner requested Gen. John J. Pershing, the US wartime commander in France, to discard the square division structure. Pershing recommended that the infantry division be reorganized along the lines of European triangular divisions. He recommended that units needed only for specialized operations be pooled at the level of corps and field army. These principles eventually produced a comprehensive review of the fundamental relationships between the different arms and services. The triangular division was not adopted until 1939-1942.

**Weapons Pooling.** The principle of weapons pooling was continued throughout the triangular division. Light antitank guns, heavy mortars, and machineguns were relegated to the heavy weapons company of each battalion. Specialized arms such as tanks, antiaircraft, and most antitank weapons were not authorized within the division. The division received only one reconnaissance troop, with long-range reconnaissance being assigned to higher headquarters. The result was an infantry force that was more mobile and more heavily armed than its predecessors, yet deficient compared to foreign armies. Its primary drawbacks, in addition to automatic weapons, was its limited capacity for antiaircraft and antitank defense and its lack of armor.

**Triangular Infantry Division, June 1941.** The 1935 division proposal had envisioned a division artillery consisting of three combined 75-mm gun/81-mm mortar battalions for direct support. A four-105-mm-howitzer battalion was for general support. In actual testing, the artillery found that the 81-mm mortar was essentially an infantry weapon. Later, the decision was made to have three battalions of 75-mm guns replaced by 105-mm howitzers, plus 155-mm general support artillery. The June 1941 organization represented the final step prior to American entry into the war (see [Figure 6](#)).



Air Support. Close air support was also lacking in the American combat team. The US Army Air Corps was preoccupied with strategic bombing to the neglect of close air support. As in France and Britain, American aviators argued that airpower was best used in areas beyond the range of ground artillery. This apparently logical division of labor overlooked three aspects of ground combat:

- The psychological impact of close-air attack.
- The necessity of massing all combat power to overcome the inherent advantages of the defender.
- The need to achieve this mass rapidly in order to sustain mobile operations and deny the defender time to organize.

Such techniques were to be used to avoid the delays and logistical build-up necessary for a deliberate, breakthrough attack. All three aspects argued in favor of close air support at the critical point. In 1939-40 only the German Luftwaffe had made even limited preparation to provide such support.

### Summary

The preceding discussion of the five different armies appears to go in five different directions. However, certain common threads are evident. First, it was evident that common elements hampered the development of new weapons and doctrine in every army except the pre-1937 Red Army. Those elements that hampered development were anti-war sentiment and limited defense budgets. As a result, no nation was fully equipped with modern weapons when it entered World War II. However, the Germans were several years ahead of their opponents and had more experience and training with such weapons.

Second, the World War I traditions of infantry-artillery dominance delayed new developments designed to broaden the nature of the combined arms. The Red Army was again the exception until 1937. In the British, French, and American armies, mechanization developed in two divergent directions. Heavy formations supported conventional infantry attacks. Highly mobile but poorly armed and protected light forces performed cavalry functions. For the British, the demands of imperial policing further restricted any move towards development of large mechanized units. Still, even the Germans and Soviets diverted some armor to specialized cavalry and infantry-support roles. During the 1930s, professional soldiers gradually broke free of traditional, 1918 views of the role of various arms. The Germans had the advantage in these new developments. The Germans funneled more of their assets into fewer panzer units than did their opponents. German opponents tended to modernize a much larger part of their armies.

Finally, the air power advocates of all nations retarded the development of close air support for ground operations. Even the Germans had only the embryo of an air-ground command and control system when the war began.

Had World War II come in 1936 or 1937, Tukhachevsky's developments in the Red Army probably would have triumphed despite problems with materiel and training. Had the war begun in 1942 or later, the British, French, and Americans would all have had time to experiment with, and adjust, their mechanized organizations and doctrine. Germany's military success in 1939-41 was therefore the



product of a very transitory set of advantages. The Germans had produced equipment and fielded mechanized units in the mid-1930s. This equipment was still usable and the units were well organized and trained when the war began in 1939. In addition, Germany had two advantages that the other powers lacked:

- A primitive but developing close air-support system.
- A command and control network that allowed for much more rapid maneuver than any opponent could achieve.

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## Lesson 2

### Learning Event 1

### Practice Exercise

**Instructions** The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

1. Listed below are common factors that hampered military change in most nations prior to entering World War II. Which one is not a factor that hampered change?
  - ☐ A. Anti-military feelings following the first world war.
  - B. Tight defense budgets.
  - C. Technology.
  - D. Favor of the more traditional combat arms.
2. In 1918, this army led the world in both armored equipment and armored doctrine. However, by 1939 they had lost most of their pioneering advantage in equipment and technology. Which army is described here?
  - A. British.
  - B. German.
  - C. French.
  - D. Soviet.

3. This army, defeated in 1918, developed mostly new tactics and weapons during the interwar period. Which army is described here?
  - A. British.
  - B. German.
  - C. French.
  - D. United States.
4. In 1935, the first panzer division was formed. Within which army was such a division created?
  - A. British.
  - B. German.
  - C. French.
  - D. Soviet.
5. During the 1920s and early 1930s, the concept of "Deep Battle" came into play. It employed conventional infantry and cavalry divisions, mechanized formations, and aviation in concert. Who developed this idea of "Deep Battle?"
  - A. Charles de Gaulle.
  - B. Adolf Hitler.
  - C. Mikhail Tukhachevsky.
  - D. Georgi Zhukov.
6. Which army employed the principle of weapons pooling within their triangular division?
  - A. German.
  - B. French.
  - C. Soviet.
  - D. United States.
7. Hitler, in forming the first panzer division, made the same mistake in balancing the division as did other armies before him. His division was top-heavy in what respect?
  - A. Armor.
  - B. Troops.
  - C. Armament.
  - D. Tanks.

8. In the '30s, French Chief of Staff Maxime Weygand took significant steps to modernize and mechanize the French Army. In 1934 Weygand formed the first "light mechanized division," but something almost ended the concept. What was it?
- A. Antiwar sentiment.
  - B. The development of the French Air Force.
  - C. The writings of Charles de Gaulle.
  - D. The development of the German panzer division.
9. What provided a trial of Soviet doctrine on the eve of World War II?
- A. The execution of Mikhail Tukhachevsky.
  - B. The Russian Civil War of 1918-'21.
  - C. The Khalkin-Gol Campaign.
  - D. The development of the "Deep Battle" concept.
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## **LEARNING EVENT 2**

### **WORLD WAR II**

#### Major Trends

World War II did more than force armies to integrate all the available arms at every level into a mobile, flexible team. It forced those armies to adjust to a variety of threats and terrain. Despite the vast scope of the struggle, some major trends are evident.

First, the mechanized combined arms force came of age in this war. In 1939, most armies still thought of an armored division as a mass of tanks with relatively limited support from the other arms. By 1943, the same armies had evolved armored divisions that were a balance of different arms and services. Each arm had to be as mobile and almost as protected as the tanks they accompanied. The Soviet, German, and American armies cannibalized infantry-support tank units to form more armored divisions.

Second, this concentration of mechanized forces in a small number of mobile divisions left the ordinary infantry unit deficient in two areas. Those areas included antitank weapons for the defense, and armor to accompany the deliberate attack. The German, Soviet, and American armies therefore developed a number of tank surrogates such as tank destroyers and assault guns to perform these functions in cooperation with infantry.

Third, one of the driving forces in both of the previous trends was the gradual development of the means to counter and control the blitzkrieg. Between 1939 and 1941, conventional infantry units were unprepared psychologically and technologically to defeat a rapidly moving armored foe who broke into

the rear areas to disrupt communications and organization. By 1943, those same infantry units had lost their paralyzing fear of armored penetration and had acquired a much greater antitank capability. Successful armored penetrations were still possible, but they were increasingly difficult.

Finally, World War II represented the end of pure ground operations.

- Mechanized attack required air superiority and close-air support.
- Airborne landings required close coordination between air transport and ground forces.
- Amphibious landings developed as the most sophisticated and complicated form of combined arms and joint operations.

Such joint service interaction was not achieved without operational errors and doctrinal arguments. By the end of the war, ground commanders had reached a temporary working compromise with other services on most questions.

Next, we will examine these developments and the movement toward combined arms doctrine. The best method is to consider the actions and reactions of the opposing armies during the course of the war.

#### 1939, The Situation in Poland

During early September 1939, Germany overwhelmed Poland and occupied more than half of its territory. The speed of the conquest concealed a number of problems that the Germans encountered. As a result, the Germans widened the gap of experience and experimentation that separated them from their future opponents, Great Britain and France. Some of the problems that existed within the German Army include the following:

- German higher commanders had not accepted Guderian's theories and did not employ their mobile divisions in mass for deep exploitation.
- German tanks and motorized infantry had not developed close interaction with fire support.
- Many German tactical commanders were too cautious, allowing themselves to be halted even by minor Polish resistance.
- Significant problems of supply and maintenance developed.
- The general unsuitability of German equipment also constituted a problem.

Evolution of the Panzer Division. Beyond some of the organizational changes, German tactical concepts and structures seemed essentially sound. Through the Polish campaign, the Germans learned that armored forces were at a disadvantage when fighting on urban terrain. Fifty-seven tanks were lost in a single day while attempting to seize Warsaw. This experience reinforced the need for a higher proportion of infantry to tanks, in order to provide close-in security for the tanks on urban terrain. In urban terrain, the tanks were vulnerable to short-range antitank attacks from nearby buildings.

A basic result of the German invasion of Poland was to begin the slow evolution of the German panzer division structure towards greater balance among the arms. The new 10th Panzer Division, along with

other formations, shared this movement toward more balanced organization. This trend toward a more balanced division would continue throughout the war .

#### 1940, The German Advance

Between the fall of Poland in 1939 and the beginning of the Belgian-French campaign in May 1940, another German operation unsettled Allied morale and foreshadowed the future complexity of joint operations. On 9 April 1940, an improvised German force used motor movements, small-scale airborne drops, and seaborne landings to occupy Denmark and Norway by surprise. The combined "warfare in three dimensions (land, air, sea) caused a shift of Allied resources. The shift meant further confusion and delays in the process of mobilizing and training British and French troops. Another surprise attack occurred on 10 May 1940, when the main battle in France and Belgium was joined. A small party of German glider troops landed on top of Eben Emael, the key to the Belgian defensive system. By this surprise attack, the Germans eliminated one of Belgium's main defenses. These surprise attacks caused many Allied military and civilian leaders to become excessively concerned about the rear area threat posed by airborne and unconventional warfare forces. Such concern was the first step in creating the psychological uncertainty that was so critical to the success of the blitzkrieg.

Mechanized forces - German Advance. In their advance through the Ardennes forest, the Germans concentrated their mechanized forces into a few large masses at critical points. Seven out of ten panzer divisions advanced through the Ardennes forest on a seventy-kilometer front. Five motorized divisions followed close behind to mop up and protect the flanks. Conversely, the western Allies had organized themselves for a linear defense. They spread their forces thinly across a wide front. The main German attack shattered this linear defense and continued with deep exploitation into the enemy rear. German commanders did not always lead with tanks. This illustrates the use of a combined arms doctrine. The armored reconnaissance battalions led the advance by up to a day's march. Engineers were used to clear obstacles when needed. Commanders used armored vehicles or light aircraft for control during the pursuit.

German training in combined arms was especially evident during the penetration of the Ardennes. The rapid German advance over a poor road network was made possible only by road repairs conducted by combat engineers. Antiaircraft guns in the German columns decimated Allied air attacks. At the critical crossing of the Meuse river on 13 May, the German infantry (plus engineers) crossed the river under the covering fire of tanks, artillery, and tactical aircraft.

The fall of France demonstrated the importance of combined arms mechanized formations and blitzkrieg penetrations. It also demonstrated the German advantage over the British and French in combined arms training and procedures.

#### 1940-42, Great Britain.

Due to the sudden collapse of France in 1940, many professional soldiers in a number of armies began to reassess their organizations as well as their offensive and defensive doctrine. Great Britain had the most urgent need to reorganize its forces and reassess its doctrine.

Lt. Gen. Montgomery. The most unusual feature of the period 1940-42, was the conduct of large-unit-command-post exercises and field maneuvers. These exercises required detailed study before, and

critiques after, each step. Lt. Gen. Bernard J. Montgomery had used such exercises as a division commander in France during 1939-40. This technique allowed his division to move more rapidly and flexibly than most other British units. Again, Montgomery applied the same training techniques as commander of two different corps and finally of an army-level force.

**Integration and Centralized Control.** Montgomery argued that few British officers had experience maneuvering any unit larger than a brigade. Certainly, his exercises helped to produce commanders, staffs, and units that were capable of much more rapid changes in deployment and mission than those of World War I. More importantly, Montgomery and others developed the concept of integrating different arms. They also envisioned how to commit divisions and larger units to battle. Montgomery argued that the decentralized nature of mechanized pursuit and exploitation had caused many British commanders to lose sight of the concept of centralized control. He contended that reconnaissance, artillery, tanks, infantry, engineers, and air power had to be "stage managed" at the highest levels. This had to be done to concentrate combat power at any point where the enemy presented an organized defense or attack. Only in a fluid situation could commanders decentralize these arms and push them forward. Then, subordinate leaders would have the different weapons readily available. Defense meant not a series of fixed lines on the battlefield. Rather, defense meant blocking positions in depth plus massive counterattacks. All arms needed to employ night attacks to reduce the lethal effects of aimed enemy fire.

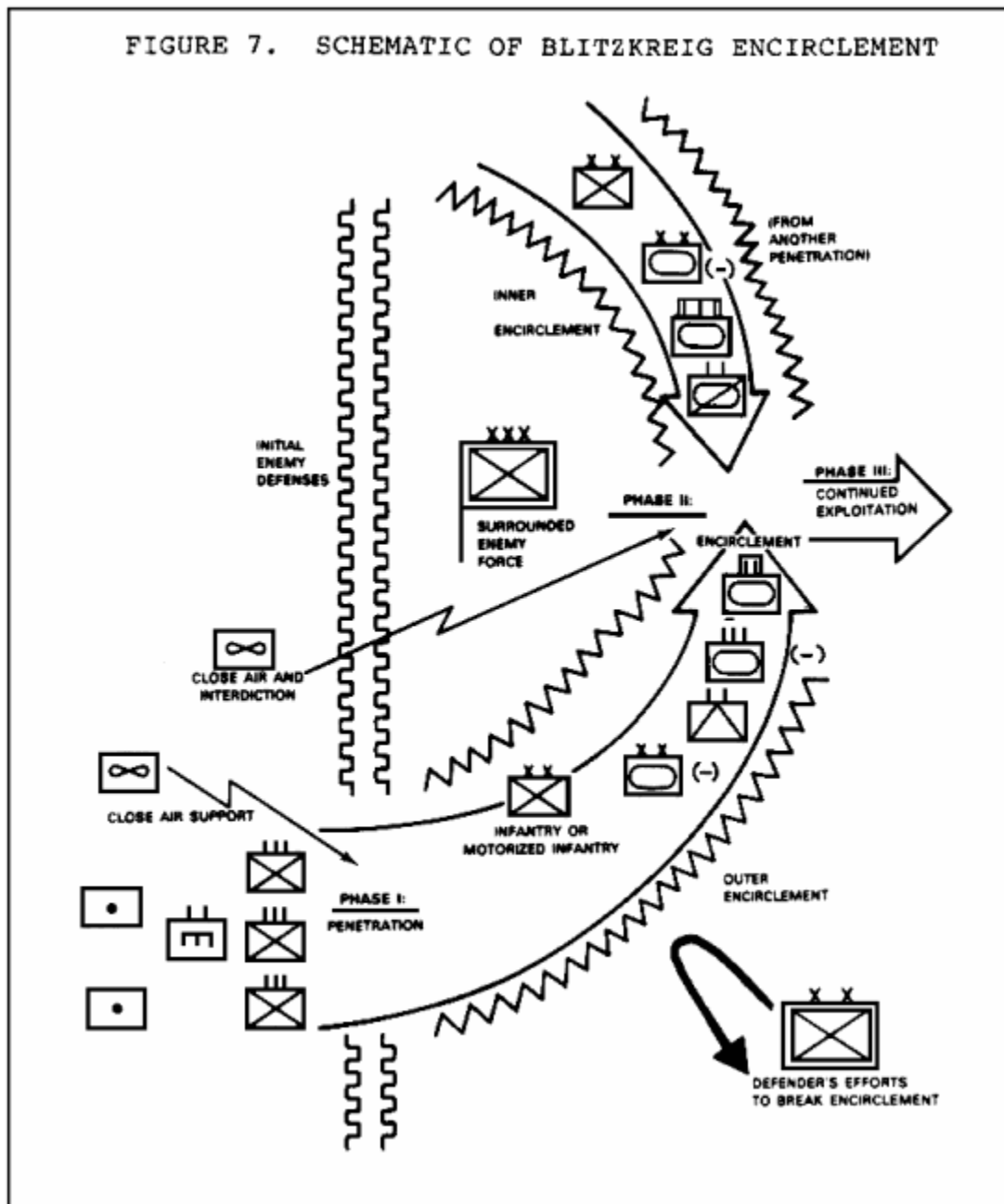
Montgomery opposed the traditional British concept that tank units should maneuver like cavalry. Instead, he saw the armored division as a combined arms force. This combined arms force would seize key terrain in order to use the advantages of tactical defense when enemy armor counterattacked. Infantry and antitank forces would follow the initial armored assault to mop up and hold terrain, releasing the armor to refit or attack again.

#### 1941, The German Advance in Russia

During 1940-'41, the Soviet government undertook massive reforms in military organization, equipment, command structure, and deployment. None of these changes were complete when Germany attacked in June 1941. The Germans caught the Red Army in transition and ripped it apart. The German Army was at the top of its form. Hitler's desire for more panzer divisions had improved the balance of arms within those divisions. In order to assemble the tanks necessary for the additional divisions, all panzer divisions were reduced to only two or three tank battalions of three companies each. This made a total of 150-202 tanks per division. Infantry totaled four trucked and one motorcycle battalion. Each division had six to nine tank companies and fifteen motorized infantry companies. This ratio was probably the most effective for all forms of mechanized combat.

**Encirclement and Deep Exploitation.** Operationally, the 1941 campaign was the high point of German blitzkrieg and especially of the encirclement battle. An analysis and description of these encirclements offers the best summary. Refer to [Figure 7](#) as you read the analysis of blitzkrieg encirclement.

FIGURE 7. SCHEMATIC OF BLITZKREIG ENCIRCLEMENT



Phase I: Penetration. First, the attacker had to penetrate or outflank the enemy's defenses. This was relatively easy in 1941 when the Germans caught the Soviets in their peacetime garrisons, unorganized for any coherent defense. Under these circumstances, the attacker could exploit immediately with armored units. If a deliberate attack proved unavoidable, the Germans preferred to conduct the penetration with a conventional infantry force. The infantry force was supported by engineers to clear obstacles, and with artillery and preplanned air strikes to suppress enemy defensive fires. As the war lengthened, such penetrations became increasingly difficult for all armies.

Phase II: Encirclement; Phase III: Continued Exploitation. Next, once penetrations or flanking maneuvers had succeeded, the German armored forces sought to encircle the enemy in pincers. A combined arms battlegroup of battalion or regimental size usually led each pincer. After the jaws of the

pincers closed, the attacker had to create two encirclements. Once facing inward, to hold the surrounded force and gradually reduce it. The second facing outward, to ward off any efforts to relieve the encircled units. In order to establish these encirclements, the Germans tried to give each panzer corps one or more motorized infantry divisions to follow and support the two panzer divisions. In practice, the Germans never had enough force in a panzer corps to seal off the encirclements. Thus, the process of holding and reducing encirclements had to wait upon the arrival of the foot-mobile infantry divisions. During the interim, surrounded Soviet soldiers were able to infiltrate or break out of the loosely cordoned encirclement. They escaped to join local partisans or to return to their own lines and fight again. This lag time also immobilized the panzer units. It prevented exploitation and gave the defender time to reorganize his forces farther to the rear. Only when the infantry and logistics had caught up with the panzer units could the latter resume Phase III - the exploitation and pursuit.

#### 1941-'42, Soviet Recovery

As the Germans advanced into European Russia, the Soviet military took desperate measures to overcome their weaknesses. Two problems were immediately apparent.

- First, the average Soviet commander or staff officer lacked the skills necessary to coordinate the different arms and weapons for an effective defense or counter attack.
- Second, the Red Army was seriously short of the specialized units and weapons that its commanders found so difficult to employ. This included engineers, tanks, antitank guns, and artillery.

Centralized Control. The solution to both of these questions seemed obvious. Stavka (Supreme Headquarters) Circular 1, dated 15 July 1941, ordered the simplification of the commander's span of control by centralizing specialized units into pools at higher levels. This allowed more experienced commanders to mass them at the critical points. In December 1941, the Soviet commanders began to revive their organization and doctrine. Not until January 1943 did the Soviets finally produce a coherent tank army. The six tank armies formed in 1943 were the spearheads of all Soviet offensives for the remainder of World War II. Thus, the Red Army had discovered the need for effective and mobile logistical support to make the mechanized offensives possible.

#### 1943-'45, Russian Innovations

Many of the foregoing technological considerations became evident on the Eastern Front, beginning with the Battle of Kursk in July 1943. The last great German offensive in the east ran directly into an elaborately prepared Soviet defense organized around antitank strongpoints established by units of company size or larger. The German blitzkrieg stalled because it was unable to achieve the initial penetration of the enemy's defenses. Thus, after Kursk, the Soviet Union held the initiative.

In the course of the war, improvements in Soviet logistics led to steady increases in the depth of exploitation. The Red Army developed a variety of techniques for both penetration and exploitation against the German defenders. Those techniques include the following:

- Reconnaissance echelons.
- Deception measures.



- Assault groups.
- Forward detachment.

Reconnaissance Echelons. One significant development during 1944 was the change in Soviet reconnaissance techniques before a deliberate attack. Prior to that year, the Red Army conducted small, time-consuming long-range reconnaissance patrols. Early in 1944, the Soviets sought to shorten the time required to prepare for a new offensive. By late 1944, the Soviets had transformed their reconnaissance units into the first wave of the deliberate attack. Company and larger units on reconnaissance missions attacked within a few hours of the main offensive, seizing German outposts and thereby unmasking the main German defenses. The main attack focused on those principal defenses.

Deception Measures. Although Soviet commanders massed their forces on relatively narrow breakthrough fronts, their successes were due to more than just numerical superiority. The Soviets used a variety of procedures to overcome German defenses. Artillery units fired their preparatory salvos under centralized control. More importantly, they used a variety of deception measures. One such measure consisted of sending the assault infantry forward during a lull in the firing. This was done to lure the Germans out of their bunkers so that renewed Soviet artillery fire could destroy them. Heavy tanks were used to support the infantry and eliminate strong points. Medium tanks were used to penetrate rapidly and suppress enemy infantry fires. Assault guns were used for direct-fire support against antitank guns and strongpoints. Combat engineers or specially trained infantrymen frequently rode on each tank. Their mission was to eliminate obstacles and provide close-in protection for the tank from German short-range antitank weapons.

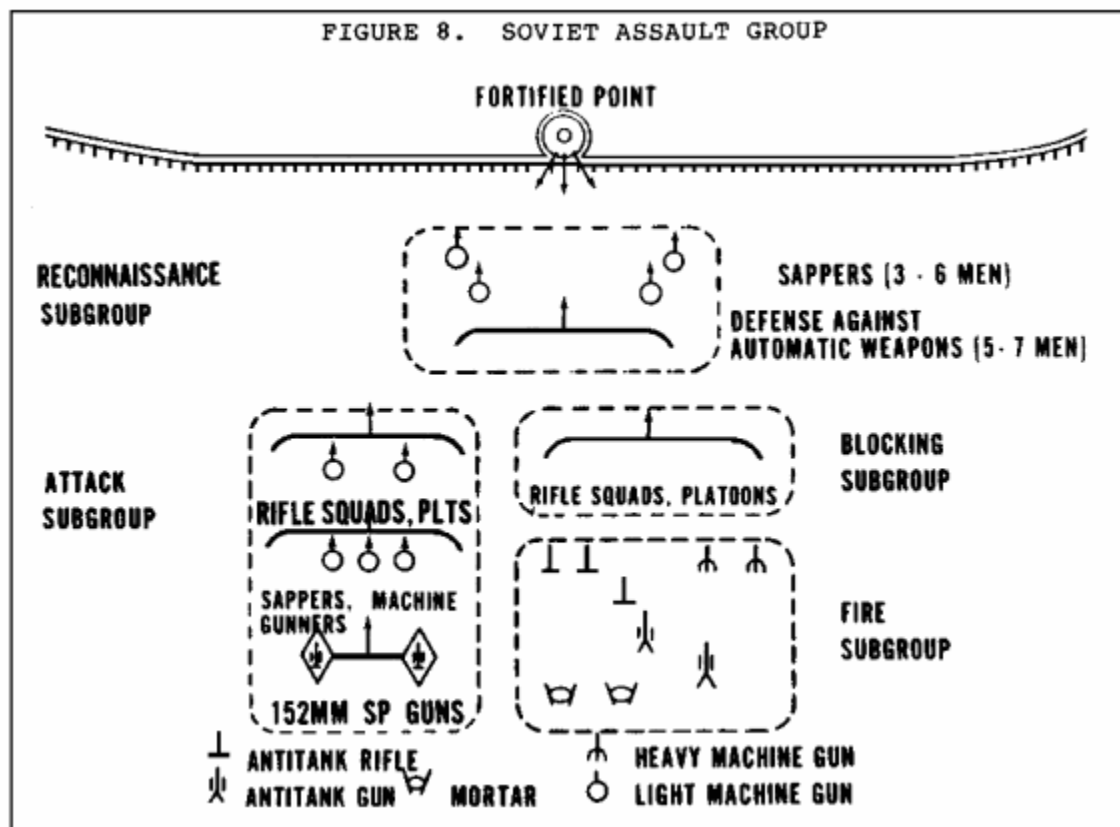
Assault Groups. The above technique produced a high number of Soviet casualties. The Soviets reluctantly accepted the high casualties in an effort to accelerate their rate of penetration. However, the 1944 casualties were a subject of great concern to the Soviets. The best means to reduce casualties were:

- Concentration
- Speed of penetration.
- Careful task organization of the attacking forces.

This led to the organization of assault groups. Instead of advancing on-line and en masse, the Soviet attackers operated in tailored assault groups of platoon to battalion size. A Soviet assault group is shown in [Figure 8](#). When time allowed, each assault group trained to eliminate a specific German strongpoint. Assault groups normally consisted of the following four subgroups:

- A reconnaissance subgroup to clear an approach route to the objective.
- A blocking subgroup to engage and pin down the defenders.
- A fire subgroup to isolate the strongpoint from reinforcement.
- An attack subgroup-including engineers and heavy tanks or assault guns.

All of the above subgroups were organized to eliminate the objective from the flanks or rear.



Beginning in 1943, a combination of factors allowed the Soviets to defeat most German counterattacks and continue their mission. Those factors included:

- Declining German combat effectiveness.
- Growing Soviet tactical experience.
- Better close air support of the exploitation forces.

Forward Detachment. The most common formation for Soviet exploitation was the "forward detachment." This was a combined arms organization of great mobility and firepower that was sent ahead of the main unit to seize key objectives and disrupt enemy efforts to reorganize the defense. During the war, the size of the typical forward detachment and the distance it operated ahead of the main body increased steadily. In the last two years of the war, a forward detachment consisted of a tank brigade reinforced by the following:

- Batteries or battalions of field and antiaircraft artillery.
- Heavy tanks.
- Assault guns.
- Engineers.
- When available, an air controller accompanied the detachment to direct close air support.

This reinforced brigade operated as much as 90 kilometers ahead of the rest of its parent tank corps. A forward detachment did not necessarily follow the same route as the main body of troops and was not responsible for advance guard security of that main body. When logistics and lack of combat power finally halted a forward detachment, the detachment commander attempted to seize a bridgehead over the next river obstacle. That would serve as a starting point for a renewed offensive at a later date. The forward detachment led the mobile group envisioned in prewar Soviet doctrine and greatly increased the tempo of exploitation and pursuit.

#### 1943-'45, Organization and Status of the German Army

The German Army on the Decline. During the period 1943-'45, the German Army declined not only in numbers, but in overall training and tactical ability. When faced with local Soviet superiority, German defenders naturally ascribed all Soviet success to overwhelming numerical advantage. In reality, the quality of German armed forces declined as a result of their declining quantity. The following illustrates Germany's declining army:

- German divisions that were not involved in the second German offensive in the east were deliberately filled to only 55% of authorized personnel.
- Spearhead units received only 85% of their authorized equipment.
- German leaders progressively reduced the amount of training given to replacements and used training units in combat. Poorly trained German soldiers survived for only short periods at the front and had to be replaced rapidly.

This decline in infantry quality prompted German commanders to seek more firepower in the form of assault guns, antitank rockets, automatic weapons and artillery.

The Call for Reorganization. Because of personnel shortages, many German infantry divisions operated with only six instead of nine infantry battalions. In 1944, the German General Staff formally changed the division structure to reflect this reality. Thus, an infantry division consisted of three infantry regiments of two battalions each. In practice, some divisions organized themselves into two regiments of three battalions each. In either case, the 1944 German infantry division retained all four artillery battalions of the previous structure. Thus, the declining ability of the infantry was offset by a larger proportion of fire support. The 1944 divisional organization also included a battery of self-propelled anti-aircraft guns.

The Effect on the Panzer Division. While the infantry divisions gradually wore down, the Germans made a belated effort to rebuild their panzer forces. Heinz Guderian dedicated himself to this task. Guderian still insisted that the panzer arm should be a force separate from the rest of the German Army. However, this was no longer appropriate. Panzer divisions were the principal German instrument for counterattacking enemy penetrations and encirclements. However, these divisions were few in number compared to the great distances on the Russian front. They often counterattacked singly or in pairs, wearing themselves down as fast as Guderian could rebuild them. Guderian only increased the estrangement between the panzer and infantry forces and made training between the arms more difficult.

Despite these problems, the balanced panzer division remained an extremely effective force at the tactical level. Production requirements for tanks, assault guns, and other tracked vehicles meant that the panzer grenadiers remained largely motorized, rather than mechanized. In the fall of 1943, the German panzer force had only 11% mounted in armor half-tracks. Thus, no more than one of the four to five infantry battalions in a panzer division was actually mechanized. Generally, one or two companies of such a mechanized battalion accompanied each panzer battalion in advance. The motorized infantry followed later to consolidate and defend the areas seized by the first attacks. Artillery forward observers in tanks or half-tracks accompanied the first wave. To protect the attacking panzer force from enemy armored counterattack, antitank guns leapfrogged into a series of overwatching positions on the flanks of the advance. Assault guns remained with the motorized infantry reserves to consolidate gains or to engage an enemy counterattack that penetrated into the division mass. During 1944-'45, German armored forces needed much greater air defense protection. Therefore, truck-mounted panzer grenadier battalions included 20-mm anti-aircraft guns. Tank and half-track mounted infantry received self-propelled anti-aircraft guns. Such was the theory of panzer organization and tactics. In practice, however, the declining strength of such units produced a variety of improvised battlegroups.

Next, we will consider the organization and tactics of the American forces.

#### 1941-'45, Organization and Status of the American Army

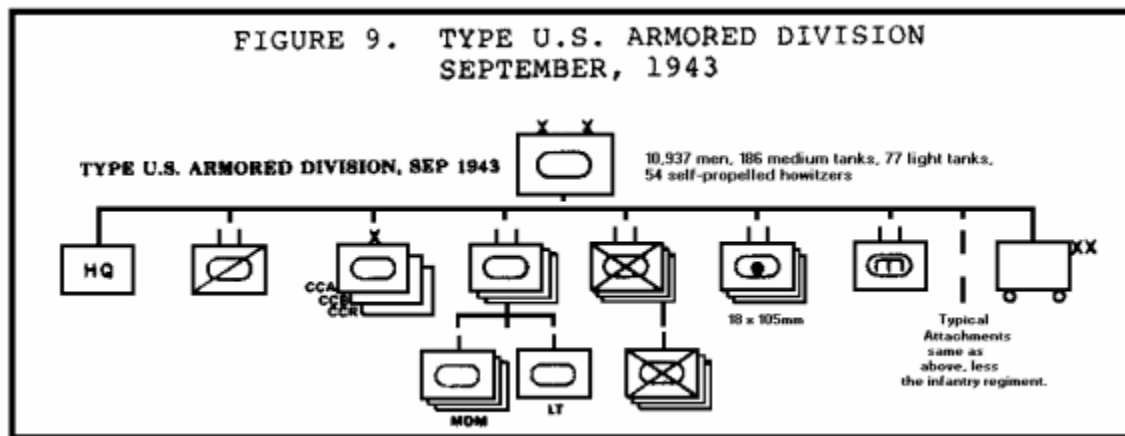
Most of the US Army did not become involved in major ground operations until the end of 1942 or even later. During 1941-'42, however, the US drew certain conclusions about weapons, organization, and tactics. They implemented those conclusions by continuing the evolution of the triangular infantry division and the 1940 armored division. However, certain mid-war changes in American doctrine and organization occurred. The resulting tactical system dominated American military thought into the 1950s.

McNair, Head of Army Ground Forces. In March 1942, Lt. Gen. Lesley McNair became head of Army Ground Forces. Thus, he was in charge of all unit training and organization. McNair continued to follow the basic organization of the triangular division. McNair's Army was recognizable by the following features:

- Each unit had only the minimum essential forces. Thus, the standard base of the division included:
  - three infantry regiments.
  - four artillery battalions.
  - a reconnaissance troop.
  - an engineer battalion (developed in 1937-'41).
- Specialized units were streamlined out of the infantry division. They became a pool of specialized nondivisional companies and battalions. Thus, each unit could be attached to a division for a particular mission.
- Staff and support elements were as small as possible. This was done to maximize the proportion of forces actually available for combat.

- The amount of motor transportation in a unit was restricted as much as possible. This was done to facilitate strategic development. With fewer vehicles organic to a division, the less shipping space that division would need when sent overseas.

1943 Reorganization of the Armored Division. However, when the US employed McNair's concepts overseas, they proved only partially successful. The triangular division in combat was much larger, more rigid, and more motorized than McNair had envisioned. Many of the attached forces were subdivided and further attached to infantry regiments. The division's organic assets such as engineers and medical support were also subdivided and attached to infantry regiments. During the same period, the armored division underwent more changes than the infantry division. By early 1943, intelligence studies had reinforced General McNair's desires for a less cumbersome division structure. In September 1943, the War Department announced a new, smaller armored division structure. The 1943 structure had three battalions each of tanks, armored infantry, and armored field artillery. They were task organized under two headquarters, Combat Command A and B. In practice, there were twelve tank companies to only nine infantry (see [Figure 9](#)). A third, smaller combat command headquarters, designated reserve or R, was added to control units not subordinated to the other two combat commands. Some division commanders used this "CCR" as a tactical control element like CCA and CCB.



Organizational Problems. Prior to 1943, the US Army faced a variety of problems. Inexperience and organizational difficulty was evident. During the 1942-'43 invasion of North Africa, American commanders scattered their forces in regimental or smaller units. This deprived them of the advantages of the American centralized control system. In training, US armored divisions stressed decentralized mobile combat utilizing direct fire. Thus, their self-propelled artillery battalions had neglected the study of indirect fire techniques. Inadequate logistics forced the Americans to leave their corps artillery far behind the front in Tunisia. This further reduced available fire support when the Germans counterattacked in February 1943.

The Need to Coordinate Combined Arms Actions. Similar problems arose in the Southwest Pacific. In 1942, General Douglas MacArthur committed the 32nd Infantry Division to battle in Papua with no artillery and only a few mortars. The 32nd Division commander protested. However, Mac Arthur's staff mistakenly thought that artillery would be ineffective in the jungles. Moreover, the local air commander

failed to provide effective air support throughout the long campaign. Weather and terrain often prevented such air support. There was so little communication between air and ground that the local air commander's pilots attacked Americans by mistake. The 32nd division learned at great cost the need to coordinate artillery and air support with the infantry.

An additional problem that added to communication short-comings was the inadequacy of radio communications. Radios issued to infantry, tank, and fighter aircraft units had incompatible frequencies. That fact made communication among the arms impossible.

The Move Toward Combined Arms. The US Army gradually corrected the problems mentioned above. They were able to develop more effective combined arms teams in the 1944 breakout from Normandy. The need for close tank-infantry cooperation reinforced the association of the same tank battalion and infantry division. Signalmen installed improvised external telephones on tanks, enabling accompanying infantry to enter the tank intercommunications network. The development of close air support for US forces took a major step forward in July 1944. VHF aircraft radios were installed in the leading tanks of each armored task force and tanks could communicate with fighter bombers. While close air support could be wasteful of air resources, the high tempo of exploitation these tank-aircraft teams could maintain justified the expenditure.

#### Air-Ground Cooperation

Air support of ground operations, and especially close air support, was the subject of intense controversy between ground and air services during World War II. The importance of air superiority was not an item of debate. However, ground attack was a cause for dispute. That controversy was perhaps most acute in the United States. Questions involved found echoes in other nations as well.

Throughout the war, the US Army Air Forces (AAF) operated almost independently from the other elements of the Army. Soon after Pearl Harbor, President Franklin D. Roosevelt gave the AAF a tremendous mission. Its mission was precision strategic bombing of Germany and eventually Japan. This mission strained the limited US air resources for most of the war. AAF leaders believed strongly in the value of strategic bombing. This belief only increased their tendency to distance themselves from the ground arms. The result was near disaster on the battlefield.

Problems with Air-Ground Cooperation. One of the elements that magnified the air-ground cooperation problem was the lack of joint air-ground training. Close air support missions were the exception rather than the rule. General McNair tried to reverse this problem. McNair argued that this exception should be stressed in training because it was the most difficult form of ground attack mission. The AAF was unwilling to cooperate. To magnify the problem, the AAF arbitrarily changed radios in fighter-bombers to a type that was incompatible with ground radios. Air and ground units had little understanding of the tactics and capabilities of their counterparts. Ground forces received little air support. Ground commanders with no experience in the employment of tactical air support misused the little that was available. The result was US ground troops firing on their own aircraft. Gradually, both sides learned to recognize and cooperate with each other. However, the process was painful.

The Move Toward Successful Cooperation. Late in the war the United States developed a formal doctrine and training procedure for air-ground cooperation. The following resulted:

- The XII Air Support Command collocated its headquarters with the fifth US Army in Italy. They met each evening to plan strikes for the next day and improvised a common network of liaison officers and radios.
- The 9th US Tactical Air Force and some of the US field armies in France and Germany established priorities to be followed by the ground operations officer and the air operations officer.

By 1945, most armed forces had developed techniques for effective air-ground cooperation in the field. However, such techniques did not resolve the basic doctrinal differences between air and ground components. These disputes persisted in peacetime long after the procedures for close air support were forgotten.

### Summary

The major trends of World War II include the following:

- The mechanized combined arms force came of age in this war.
- The concentration of mechanized forces in a small number of mobile divisions left the ordinary infantry unit deficient in two areas. Those areas included antitank weapons for the defense, and armor to accompany the deliberate attack.
- The gradual development of the means to counter and control the blitzkrieg.
- World War II represented the end of pure ground operations.

The development and organization of combined arms is evident throughout World War II. The evolution of the German panzer division came about during the German invasion of Poland in 1939. This structure reflected a greater balance among the arms. In 1940, the Germans used "combined warfare in three dimensions" to occupy Denmark and Norway by surprise. This combination of motorized units, airborne drops, and seaborne landings illustrated the future complexity of joint operations. The fall of France in 1940 demonstrated the importance of combined arms, mechanized formations and blitzkrieg penetrations. It also demonstrated the German advantage over the British and French in combined arms training and procedures.

During the period 1940-1942, Lt. Gen. Bernard L. Montgomery of the British Army developed the concept of integrating different arms and centralized control. Montgomery also envisioned the armored division as a combined arms force. This view opposed the traditional concept that tank units should maneuver like cavalry.

During 1941, the German Army "fine tuned" its panzer divisions, thus, improving the balance of arms within those divisions. The German advancement in Russia was the apex of the German blitzkrieg encirclement battle and deep exploitation. The three phases of the blitzkrieg encirclement include:

- Phase I, penetration.
- Phase II, encirclement.
- Phase III, continued exploitation.

During the period 1941-'42, the Soviet military took desperate measures to overcome their weaknesses. Their organization leaned toward centralized control. By 1943, the Soviets produced a coherent tank army. The six tank armies formed in 1943 were the spearheads of all Soviet offensives for the remainder of World War II. In the course of the war, improvements in Soviet logistics led to steady increases in the depth of exploitation. During 1943-'45, the techniques developed by the Red Army for penetration and exploitation against German defenders included the following:

- Reconnaissance echelons.
- Deception measures.
- Assault groups.
- Forward detachment.

The above techniques represent the move toward combined arms organization. While the Soviet Army was improving, the German Army was on the decline. The German Army declined in number, as well as in overall training and tactical ability. Thus, the German Army needed to reorganize.

Most of the US Army did not become involved in major ground operations until the end of 1942 or even later. However, during 1941-'42 the US drew certain conclusions about weapons, organization, and tactics.

The US Army was organized around a triangular division. In March 1942, Lt. Gen. Lesley McNair became head of Army Ground Forces. Thus, he was in charge of all unit training and organization. In September 1943, a new smaller armored division structure that was more suitable to armored operations was announced. By the end of World War II, most organizational problems had been ironed-out, and most arms actions had been successfully combined.

By 1945, the Soviet, British, and American armed forces gained skill in combining arms. These armies had developed true combat effectiveness at the small unit level. The problem of combined arms integration shifted, at least temporarily, to a higher level of organization. The lingering problems of combining the arms in 1945 were not so much at battalion or division levels as they were between the army and the other services. Air support in particular was a critical link in the success of most offensives in World War II. Yet, the US Army had only achieved a temporary truce on this issue with the AAF. Once the war was over, the practical lessons of small unit integration and air-ground cooperation were frequently forgotten.



## Lesson 2

### Learning Event 2

## Practice Exercise

**Instructions** The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

1. Listed below are the major trends of World War II. Which of the following is not considered a major trend?
  - ☐ A. The mechanized combined arms force came of age in this war.
  - B. The gradual development of the means to counter and control blitzkrieg.
  - C. The end of the war represented the end of pure ground operations.
  - D. The move toward combined arms organization came to a standstill.
2. During 1941, the German advancement in Russia was the heyday of German blitzkrieg encirclement battle and deep exploitation. Which of the following three phases represent blitzkrieg encirclement?
  - A. Penetration, encirclement, and continued exploitation.
  - B. Penetration, attack, and continued exploitation.
  - C. Penetration, reconnaissance, and encirclement.
  - D. Penetration, blocking, and encirclement.
3. During the period 1940-'42, a general of the British army developed the concept of integrating different arms and centralized control. He envisioned the armored division as a combined arms force, which opposed the traditional concept that tank units should maneuver like cavalry. Who is described here?
  - A. Lesley McNair.
  - B. Heinz Guderian.
  - C. Bernard L. Montgomery.
  - D. Douglas Mac Arthur.

4. During 1943-'45, the techniques developed by the Red Army for penetration and exploitation against German defenders included which of the following?
- A. Reconnaissance echelons, deception measures, assault groups, and reverse detachment.
  - B. Reconnaissance echelons, deception measures, assault groups, and forward detachment.
  - C. Reconnaissance echelons, deception measures, attack, and encirclement.
  - D. Reconnaissance echelons, deception measures, attack, and reverse detachment.

## LESSON 3

# COMBINED ARMS SINCE WORLD WAR II

## INTRODUCTION

### TASK DESCRIPTION:

Upon completion of this lesson, you will be able to describe the evolution of combined arms since World War II. You will also be able to identify and explain the major trends and principles in the evolution of combined arms during the 20th Century.

- TASKS:** Demonstrate an understanding of the evolution of combined arms warfare since World War II.
- CONDITIONS:** You are given information on combined arms doctrine and tactics since World War II.
- STANDARDS:** Demonstrate understanding of the task by correctly answering 70% of the questions in a multiple-choice test.
- REFERENCES:** House, Captain Jonathan M., Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organizational, Combat Studies Institute, Research Study No. 2, US Government Printing Office, Washington D.C., August 1984.

## LESSON 3

# COMBINED ARMS SINCE WORLD WAR II

## OVERVIEW

In [Learning Event 1](#), important combined arms operations and organizational changes of the period since World War II will be discussed. We will cover Soviet and NATO organization, US doctrine and practice, and Israeli combined arms. In [Learning Event 2](#), you will be given an explanation of the major recurring trends which have emerged in combined arms warfare during the 20th Century. Some of the trends that will be covered are the balance of arms, deep warfare, and air-ground cooperation.

## **LEARNING EVENT 1**

### **COMBINED ARMS SINCE WORLD WAR II**

By 1945, the victorious armies of the Allies had developed a very sophisticated, equipment-intensive form of combined arms mechanized war. During the immediate postwar years, these armies faced two trends that argued against the mechanized, armored solution to the problems of combined arms combat. The two major reasons for the decline of combined arms include:

- First, the destructive power of the atomic bomb convinced many strategists that traditional land combat was obsolete. Since by definition nuclear warfare meant using large-scale, strategic nuclear weapons, ground combat fell into neglect.
- The second challenge to the mechanized armies of 1945 was the so called "war of national liberation" (also known as guerrilla warfare). These wars employed unconventional warfare tactics. During the later 1940s, insurgencies in China, Indochina, Greece, and Malaya made conventional armies appear too expensive and too musclebound to compete efficiently against their opposing forces.

Most major armies have been forced to adjust to the challenge of nuclear warfare and/or guerrilla insurgency. Major themes in combined arms since World War II are difficult to identify. Thus, we will examine the postwar period from three different perspectives:

- Soviet organization and doctrine.
- US doctrine and practice.
- Israeli combined arms.

First, we will consider Soviet organization and doctrine.

#### **Soviet Organization and Combined Arms, 1945-Mid-1970s**

The Soviet Army, as it was renamed after World War II, has experienced three distinct periods of doctrine and organization since 1945.

- First, from 1945 until the death of Stalin in 1953, the Soviets demobilized a portion of their forces but continued with the same tactical and operational doctrines and organizations developed during the war.
- Second, from 1953-1957, the ground forces took a back seat to the nuclear-equipped arms of the Soviet state.
- Finally, since the late 1960s, the Soviet Union has reversed this decline of landforces. They have prepared for the possibility of an extensive, combined arms mechanized conflict with or without the use of nuclear weapons.

## The Soviet Army, 1945-'66: The Decline of Conventional Forces

As stated above, during the period 1945-1953, the Soviets continued with the same tactical and operational doctrines and organizations developed during the war. However, they demobilized a portion of their forces. Stalin's death in 1953 allowed Marshal Georgi Zhukov to return to power within the armed forces. His major goal was to adjust the ground forces to the realities of nuclear warfare. All units had to become smaller for better command and control. They also had to become better armored for protection against the effects of nuclear weapons. The result was that the entire concept of combined arms seemed less important once the Soviet Army decided that any future war would be a nuclear war. Infantry and conventional artillery shrank within existing organizations. Thus, the ground forces took a back seat to the nuclear-equipped arms of the Soviet State.

**Soviet Combined Arms After 1967: A Reversal.** In 1964, a debate began within the Soviet military about the general direction of military affairs. By 1966-'67, the Kremlin had apparently determined that the existing "single option warfare" was too simplistic. The Soviet military renewed its study of conventional combined arms warfare. During the 1970s, Soviet tank regiments gradually regained the mechanized infantry and conventional artillery battalions that they had lost under Zhukov's regime. Thus, by the mid-1970s the Soviet Union had come full circle in the doctrine and organization of combined arms combat. The Soviet Union had developed armored fighting vehicles to implement its long-standing doctrine of deep battle and mechanized combined arms.

## US Doctrine and Practice

Unlike the Soviet commanders in 1945, American field commanders were only partially satisfied with their organization and equipment. 1945-'46, the General Board of the US European Theater of Operations conducted a review of the organization.

The US Army was reorganized. For example, in review of the triangular infantry division, it was concluded that armor should be organic to that division. If organic, it could provide support for infantry attacks and act as the primary antitank weapon of the army. The Army also concluded that the medium tank was the best antitank weapon.

In November 1946, the War Department finally approved a new infantry division structure and a variety of changes had occurred based on wartime experience. Self-propelled antiaircraft machine guns and 4.2-inch mortars became organic to the infantry division. Regimental cannon companies and antitank companies were canceled. The rifle-squad was reduced. In the armored division similar modifications occurred. In 1946, the War Department increased the armored infantry in each armored division from three battalions of three companies each, to four battalions of four companies each.

Most of these notable improvements in the combination of arms never actually worked because of postwar demobilization. The US Army shrank to garrison forces in Germany and Japan. At home, only skeleton units existed. Given America's nuclear monopoly, few people outside the army saw any requirement for combat-ready forces. Four divisions occupied Japan in 1950. They had only two thirds of their wartime authorization in men and equipment. Each of these divisions had only one tank company and one antiaircraft battery. They were missing one out of every three infantry battalions and artillery batteries.

The Korean Conflict. The Soviet-equipped North Korean People's Army invaded South Korea in June 1950. The understrength American divisions in Japan entered combat in a number of days. The US lack of combat power was evident. It also demonstrated that the US Army had a force structure that did not fit its doctrine. Regimental commanders were deprived of their primary antitank weapon, the tank. They had only the obsolete 2.36-inch rocket launcher for short-range antitank defense. The shortage of manpower and the hilly terrain of the Korean peninsula increased the dispersion and isolation of defending units. Such dispersion allowed the North Koreans to practice tactics that were a combination of Japanese offensive operations in 1942 and the Soviet forward detachment.

By late 1950, the US divisions had built up to their full tables of organization. They were oriented on the few roads in an effort to rapidly occupy North Korea. The initial contacts with the Chinese Communist Force (CCF) in October and November 1950 were a series of meeting engagements as the CCF repulsed US advance.

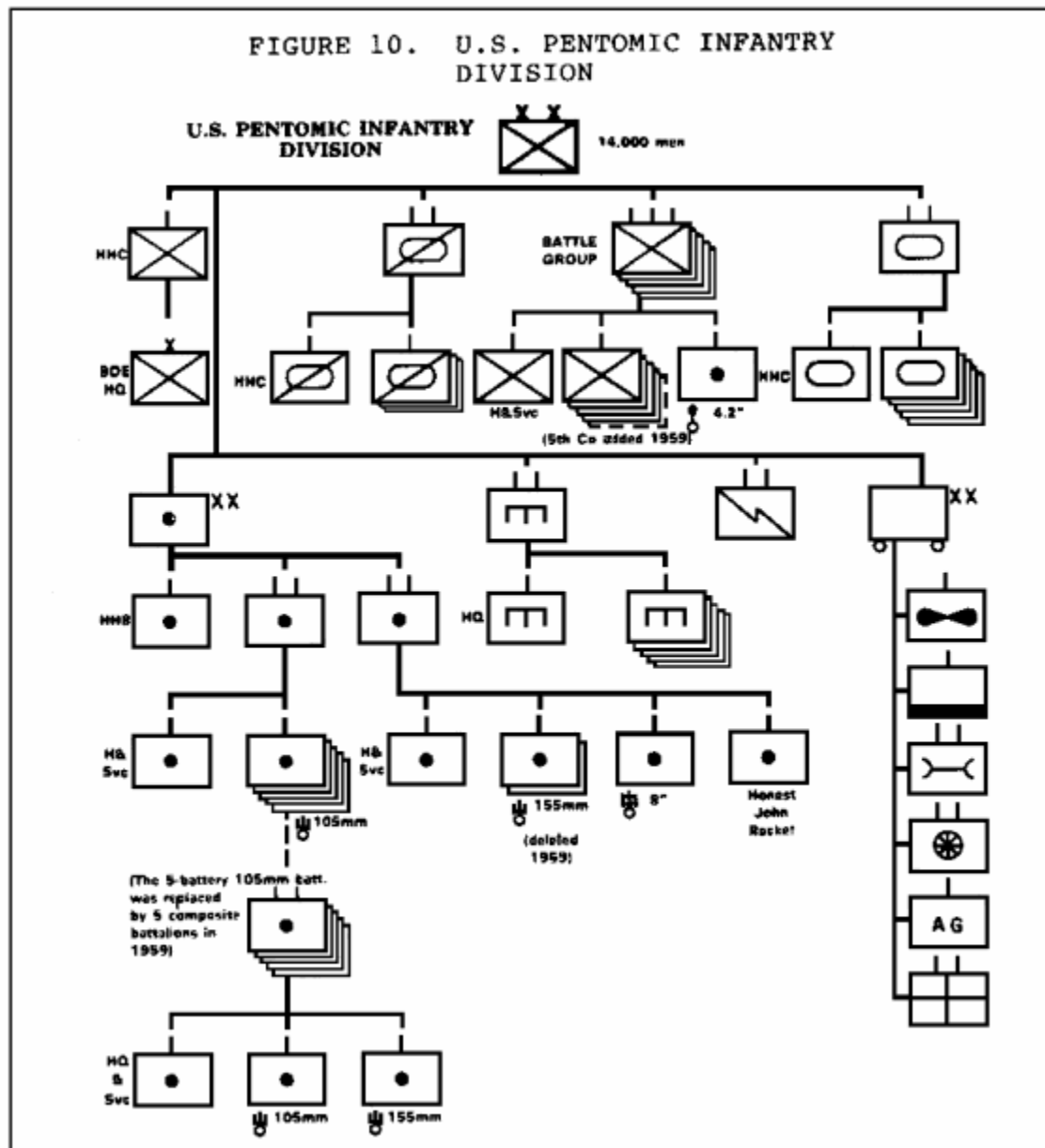
The front began to stabilize in 1951. The Korean war became a war of attrition, with each side launching limited attacks to destroy enemy personnel. The US used its World War II doctrine for combining the different arms in such attack. They modified that doctrine slightly to maximize the available firepower and to minimize casualties. In 1951, the US Army improved its fire direction capability by introducing rotating plotting boards. This allowed a fire direction center to adjust fire on a target without knowing the observer's location.

Air-ground operations provided good support. The Navy and Air Force provided a larger proportion of available aircraft for close air support. The air and ground leaders became more familiar with each other's operations and capabilities. One of the new air-ground operations in Korea was the use of helicopters. The Marines organized an experimental helicopter squadron in 1947. They used those helicopters in small assault landings during amphibious exercises. By 1953, both the army and the marines had used helicopters for medical evacuation, communications, and limited movement of troops and supplies.

US Army Organization: Pentomic Division. The success of the US Army in the Korean War caused a temporary increase in its size and budget. The army increased its armored strength from one combat command to four armored divisions between 1948 and 1956. At the same time, the Eisenhower administration chose to base its national strategy on "massive retaliation" with nuclear weapons. The US Army had to develop a doctrine and organization that would allow ground forces to function effectively on a nuclear battlefield. The Army was mandated to remain relatively light in equipment. It had to be able to deploy rapidly to any trouble spot in the world.

These strategic considerations greatly influenced the tactical structure and concepts of the army. The result was the "Pentomic Division." This was a public relations term designed to combine the concept of five subordinate units ("penta") with the idea of a division that could function on an atomic or nonatomic battlefield. Five "battle groups" were at the core of the pentomic infantry division (see [Figure 10](#)). Each battle group was an infantry formation that was smaller than a regiment but larger than the established triangular battalion. In 1959 the battle group acquired a fifth rifle company. The squad also changed increasing from nine to eleven men and officially acquiring a second automatic

rifle. As a result, the pentomic infantry squad was able to practice the fireteam, fire and movement tactics used by all Marine Corps and some army squads during and after World War II.



Problems with the Pentomic Division. Certain problems accompanied the pentomic infantry division, they included:

- Fire support difficulty.
- Inadequate number of headquarters.
- Mobility.

The effects of the Pentomic concept on the rest of the US Army were less drastic. The armored division retained its three combat commands, four tank battalions, and four armored infantry battalions. It acquired an aviation company to centralize existing aviation assets. It received the same general

support artillery battalion as the infantry division. As in the infantry division, the Armored signal company grew to a battalion.

The pentomic changes also brought the nondivisional armored cavalry regiment to the structure it retained into the 1970s. Such a squadron consisted of a headquarters and headquarters troop, three armored reconnaissance troops, a tank company, and a self-propelled howitzer battery. A reconnaissance troop represented an ideal of combined arms organization. Each of its three platoons integrated tanks, infantry, scouts, and a mortar.

This organization of cavalry reconnaissance organizations served two purposes:

- First, the variety of main battle vehicles in such units made it difficult for an opposing force to distinguish between US cavalry and other combined arms forces. Thus, it was difficult to determine whether the US force in question was simply a cavalry screen or a major force.
- Second, this combination of weapons and vehicles allowed US reconnaissance forces to develop intelligence about the enemy while engaged in combat.

By 1959, the US Army had a radically new structure and operational concept to meet the demands of nuclear warfare.

Reorganization Objectives Army Division (ROAD): flexible response. During the same time period, the possibility of non-nuclear conflict increased. In 1961 the Kennedy administration came into office. The administration was committed to the concept of flexible response. The pentomic division was heavily oriented for nuclear warfare. Thus, the army needed new structures. They must be able to fight terrorism and guerrilla wars up to fully mechanized and even nuclear warfare. The new administration quickly approved ongoing army studies for a different division organization. The new structure was the Reorganization Objectives Army Division (ROAD), see [Figure 11](#). The different types of ROAD divisions shared a common division base, including the following:

- A cavalry reconnaissance squadron.
- Three brigade headquarters.
- Division artillery.
- Division support command.
- Engineer battalion.
- Air defense battalion.

The brigade headquarters could control a varying number of combat and combat support elements. The combat arms battalion replaced the battle group as the largest fixed-maneuver organization. It retained many of the battle group's elements.





**FIGURE 12. 1st CAVALRY DIVISION (AIRMOBILE), 1965**

15,787 men, 434 aircraft, 84 howitzers, 1600 vehicles

HQ

HHT

Air Cav Troops

Ground Cav

105 mm

160 mm

Aerial Artillery

Aviation Btry

Aviation Btry

Light

General Support

Medium

SPT XX

DIVISION SUPPORT COMMAND

The concept of airmobility possessed beneficial factors. Airmobility put the enemy off balance and neutralized conventional obstacles. It also forced the US Army to change many procedures. They had to accommodate operations over a large territory without a defined "front line." For example, field artillery and signal units ordinarily oriented their support towards a particular front line or axis of advance. By contrast, in Vietnam these branches had to operate on an area concept providing fires and communications in any direction from a pattern of small bases.

While airmobility possessed beneficial factors, it also had its drawbacks. Weather and terrain factors hamper air assault operations. Since 1971, helicopters have improved navigation devices and mechanical designs. Thus, reducing technical problems associated with the experience in Vietnam certainly, the other NATO powers and the Soviet Army used the airmobile experience of Vietnam to help in the development of their own army aviation doctrine.

## The NATO Powers

During the period 1945-1960, the military policies and posture of Western European powers resembled those during the same period after 1918. The war had exhausted the Europeans. They were reluctant to finance major new weapons systems for their armed forces.

Britain, France, and West Germany all accepted the concept of combined arms or "all-arms cooperation" as a principle of tactics. The similarity of concept was reflected by some similarity in large-unit organization. All three armies converged on fixed combined arms forces. The evolution of the fixed European brigade may result from orientation on the single mission of mechanized operations in Europe.

**The British Army.** At the end of World War II, the British Army retained its two-brigade armored division and three-brigade infantry division with only minor changes. During the 1950s, the British Army on the Rhine (BAOR) developed a "square brigade" structure that was more suitable for a variety of tactical situations. Each brigade then consisted of two tank and two mechanized infantry battalions. Many brigade headquarters disappeared or became "field forces" in 1977-'78. This, plus the needs of economy prompted the BAOR to reduce the division to only six maneuver battalions in 1982.

**The French Army.** As late as 1954, the French Army retained the equipment and organization of the US armored division. After the Algerian War in 1961, the French Army renewed its study of mechanized operations and organizations. The study ended in the Type 67 (1967) mechanized division. It consisted of three mechanized brigades. Each of these brigades had a permanent structure. In the mid-1970s, the French Army began to convert all of its units to a new smaller structure. They labeled it a division. The French hoped that this smaller division structure would be more responsive and fast-moving on the nuclear battlefield. One of the unique aspects of French Army structure during the 1960s and 1970s was the organic combination of different arms within one battalion. Clearly, France led the western powers in the integration of different arms within the infantry battalion.

**The German Army.** West Germany led the western powers in the development of mounted infantry integrated with armor. The Marder was the first mechanized infantry combat vehicle (MICV) in NATO. The Marder had a turret-mounted automatic cannon, NBC protective system, and gunports for infantry weapons. The Marder became the base of fire around which the dismounted squad maneuvered as an assault team. The German concept and design for a MICV drew considerable attention and imitation in the Soviet Union and in other members of NATO. The Germans were also the only power to field new armored tank destroyers during the 1960s. However, a decade later the Bundeswehr replaced those tank destroyers with tanks.

## Israeli Combined Arms

**The Israeli Army to 1967.** Israel has become famous as an expert practitioner of highly mechanized combined arms. The Israeli Army has been involved in four wars and numerous undeclared conflicts since 1948. To understand the strengths and weaknesses of the Israeli Defense Forces, we must remember the origins of those forces.

The Israeli Army of 1948-'56 was an amateur army; poorly trained and equipped. It was forced to rely on its strengths of individual initiative and the camaraderie of small-unit leadership for its successes in

self-defense. They were sufficient until the Soviet Union began supplying Egypt with large quantities of modern weapons. It is worthwhile noting that the paratroopers of the 202nd Brigade were the honored elite of the Israeli light infantry; confirmation of the fact the nation had assigned the cream of its recruits to the airborne throughout its modern history. Eventually, between 1956-1967, Israel came to rely largely on the tank-fighter-bomber team for its victories.

The Failure of Combined Arms, 1967-1973. The Israeli armored force grew to sixteen armored and four to eight mechanized brigades by 1973. Israeli doctrine regarded the tank as the best means of defeating other tanks. Thus, the Israeli Defense Forces refused an American offer to supply the new tube-launched optically-tracked wire-command antitank guided missiles (TOW ATGMs). Thus, Israel emphasized the tank and fighter-bomber to the neglect of other arms. This neglect was also apparent in Israeli unit structures.

By contrast, the Egyptian Army carefully analyzed its weaknesses and strengths between 1967 and 1973. One reason for its initial success in the 1973 war was because the Arabs initiated a war with Israel according to a detailed plan, rather than having Israel conduct a preemptive attack. President Anwar Sadat recognized that a holy war to destroy Israel completely was impossible. In 1972 he appointed a new staff and commanders to plan a rational, limited war. However, Egyptian leadership and control procedures could not react quickly to sudden changes in mission. The Egyptian troops became demoralized rapidly in a maneuver battle where Israeli troops could bypass them and attack from unexpected directions.

The 1973 war completed the cycle in which the Israeli Defense Forces almost exactly repeated the experience of the German Wehrmacht. This was reflected in the use and misuse of mechanized forces. Like the Germans in World War I, the Israelis before 1956 regarded tanks as specialized weapons that they could not afford to maintain. In 1956, armored experts showed the Israeli commanders the value of mechanized units for penetrating and disorganizing thin enemy defenses. Guderian had done the same in 1939-40. The heyday of the Israeli blitzkrieg came in 1967. Then, like the Germans before them, they came to rely on the main battle tank and fighter-bomber to the neglect of other arms. Once their Arab opponents developed more effective means of antitank and antiaircraft defense, the Israeli commanders found mechanized operations difficult. Blitzkrieg was still possible, but it also required much greater combat power. With the added fire power, the Israelis found they relied less on the factor of psychological confusion than had been the case in earlier campaigns.

The Aftermath of 1973. As the most significant mechanized war since 1945, the fourth Arab-Israeli war of 1973 attracted concern and study by all professional soldiers. The Israelis themselves were reluctant to talk about the detailed problems they had encountered. The renewed Israeli interest in organic mortars for maneuver battalions and increased procurement of armored personnel carriers indicated that they placed greater stress on the need for fire support and mechanized infantry to support their armor.

What is clear from the 1973 war is that all weapons and arms, and especially high performance aircraft, are vulnerable on modern battlefields. This realization reinforces the need for mutual support by different weapons to negate the threats posed to other arms. In some ways, the experience of the Israeli wars revalidates the experience of World War II. Successful operations in mechanized warfare require not only combined arms organization, but also compatible equipment. Then, all arms and services can

move over the same terrain with the same degree of protection. Combined arms training must ensure that the different arms and the aviation assets can actually cooperate with each other on a complicated battlefield. ATGMs and air assault or army aviation units must be integrated into existing organizations and practices, instead of being treated as special cases.

## Summary

By 1945, the victorious armies of the Allies had developed a very sophisticated, equipment-intensive form of combined arms mechanized war. During the immediate postwar period, two trends argued against the mechanized, armored solution to the problems of combined arms combat. The two major reasons for the decline of combined arms include:

- The introduction of the atomic bomb.
- Guerrilla warfare.

The Soviet Army experienced three distinct periods of doctrine and organization since World War II. First, from 1945 until the death of Stalin in 1953, the Soviets demobilized a portion of their forces but continued with the same tactical and operational doctrine developed during the war. Second, from 1953-1957, the ground forces took a back seat to the nuclear-equipped arms of the Soviet State. Finally, the Soviets have reversed this decline of land forces. They are prepared for an extensive, combined arms mechanized conflict with or without the use of nuclear weapons.

Unlike the Soviet commanders in 1945, American field commanders were only partially satisfied with their organization and equipment. The US Army's 1944-'45 practices were reorganized. In November 1946, the War Department finally approved a new infantry division structure. However, most of these notable improvements in the combination of arms were never realized because of postwar demobilization.

In June 1950, the Soviet-equipped North Korean People's Army invaded South Korea. The understrength US divisions in Japan entered combat in a number of days. New air ground coordination procedures and integration of armor, artillery, and infantry developed out of Korean combat experiences. The front began to stabilize in 1951.

The pentomic division was created in 1956. However, this division structure lacked the flexibility of command and control required to fight in non-nuclear environments. Since the pentomic division was heavily oriented for nuclear warfare, the army needed new structures able to fight terrorism and guerrilla wars or fully mechanized and even nuclear warfare. The new structure was the ROAD organization. Created under the Kennedy administration, it was committed to the concept of flexible response. Airmobility is another major new development that allowed the US Army both firepower and mobility on the battlefield.

Today Israel and many of America's NATO Allies do not foresee conducting extended contingency Operations outside their own regions. They only need limited forces for such contingencies. Thus, the British, French, and German armies have had a tendency to standardize on integration of mechanized assets at smaller unit levels, therefore, producing fixed organizations equivalent in size to an American brigade or armored cavalry regiment. Israel was also able to focus on a limited number of possible

conflicts. The tremendous armored successes of 1967 and the lack of resources in a small nation led the Israelis to repeat the error of Germany in World War II. They relied on the tank and fighter-bomber to the neglect of the other combined arms.

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## Lesson 3

### Learning Event 1

## Practice Exercise

**Instructions** The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

1. During the immediate postwar period, certain trends argued against the mechanized, armored solution to the problems of combined arms combat. What were the major reasons for the decline of combined arms?
  - ☐ A. The introduction of the atomic bomb.
  - ☐ B. The development of airmobility on the battlefield.
  - ☐ C. Guerrilla warfare.
  - ☐ D. Answers a and c are correct.
2. Views on the doctrine and organization of combined arms combat had gone full circle by the mid-1970s in this army. First, between 1945 and 1964 ground forces were drastically reduced in the light of nuclear-equipped arms. Then, in 1967 a reversal took place, and the US Army renewed its study of conventional combined arms warfare. Which army is described here?
  - ☐ A. The Soviet Army.
  - ☐ B. The United States Army.
  - ☐ C. The British Army.
  - ☐ D. The French Army.

3. Which army organized the pentomic infantry division?
- A. The Soviet Army.
  - B. The United States Army.
  - C. The British Army.
  - D. The French Army.
4. This war was known as the most significant mechanized war since 1945. It illustrated the need for mutual support by different weapons to negate the threats posed to other arms. Which war is described here?
- A. The Korean War.
  - B. Vietnam.
  - C. The fourth Arab-Israeli War of 1973.
  - D. The Falklands.
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## LEARNING EVENT 2

### TRENDS AND PRINCIPLES: A BRIEF OVERVIEW

Certain trends or principles recur in all of the developments that we have examined. Most of these trends are self-evident. However, since they have survived the test of various technologies and armies over time, they merit some attention. The major trends that we will discuss here include the following:

- The balance of arms within an organization.
- The integration of arms at progressively lower levels of organization.
- The difficulty of defense-in-depth.
- The problem of air-ground cooperation.

#### The Balance of Arms

The major principle to be gained through examining military history from 1900 to the mid-1970s is the importance of the balance of arms. Arms must be balanced within an organization. They must be grouped together to perform according to a particular doctrine. Units above battalion level in which one arm dominates the others numerically may be useful in certain circumstances. However, they lack flexibility. Similarly, specialized arms such as the tanks and tank destroyers of World War II, have special capabilities that must be balanced against their vulnerability when not supported by other arms.

## The Integration of Arms

Major armies have tended to integrate more arms and services at progressively lower levels of organization. This must be done in order to combine different capabilities of mobility, protection, and firepower while posing more complicated threats to enemy units. Integration does not necessarily mean combining individual weapons or companies of arms together in a permanent organization. Such an organization could be dangerous tactically because battalions and companies could not adjust the balance of weapons in response to varying terrain, enemy, or mission.

To be effective, the different arms and services must train together at all times. Thus, they must change task-organization frequently. When changing task organization, it is more effective to begin with a large combined-arms unit. An example would be a division or fixed brigade. You would select elements of that unit to form a specific task force. This method is easier than starting with a smaller brigade or division and attaching nondivisional elements to that formation. In the former case, all elements of the resulting task force are accustomed to working together and have a sense of unit identity. In the latter case, confusion and delay may occur until the nondivisional attachments adjust to their new command relationships. Frequent changes in the partnership of units will produce inefficiency, misunderstanding, and confusion.

Only the need to adjust the proportion of arms to different tactical situations limits the degree to which those arms can be grouped together permanently.

## Defense in Depth

One of the problems of combining the different arms and services is the difficulty of defense against enemy penetration. The Allies in 1939-'42, and the Egyptians in 1956 and 1967 suffered in this regard. Few armies have the time and troops in peacetime to train for the establishment of a true defense-in-depth. Few have time to prepare their troops psychologically as well as technically to continue to fight when penetrated and bypassed by enemy forces. In the mid-1970s, the US Army conducted such preparation as part of the "Active Defense" doctrine in Europe. This action was attacked by critics who considered that doctrine too oriented on defense and on firepower. The true test of an army's skill in combined arms is its ability to reorient and orchestrate the different arms under the pressure of a fast-moving enemy attack.

## Air-Ground Cooperation

The last trend to consider here is the continuing problem of air-ground cooperation. Artillery and infantry learned to function together in World War I. With much difficulty, tanks, antitank weapons, engineers, and antiaircraft artillery joined that same team during and after World War II. However, the aircraft is still not fully integrated into the combined arms team. In three wars since 1941, the US Army and US Air Force have had to develop ad hoc compromises and procedures for air-ground cooperation. This was done because their peacetime training and doctrine were always inadequate. To some extent, the development of the helicopter has been an army effort to acquire a capability that receives low priority in the air force. The United States is not unique in suffering this problem. The German Luftwaffe and Army had similar disagreements during World War II. Until the legitimate concerns of



both services are adjusted, air support of ground forces will remain a division of interests at the start of each new conflict.

## Lesson 3

### Learning Event 2

## Practice Exercise

**Instructions** The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

1. Certain trends or principles recur in the developments that have occurred throughout modern military history. Which of the following reflect these recurring trends?
    - ☐ A. The balance of arms within an organization.
    - B. The difficulty of defense-in-depth.
    - C. The problem of air-ground cooperation.
    - D. All of the above.
  2. The Allies in 1939-'42, and the Egyptians in 1956 and 1967 suffered in this regard. Which problem of combining the different arms and services was reflected in these armies?
    - A. The problem of air-ground cooperation.
    - B. The balance of arms within an organization.
    - C. The difficulty of defense-in-depth.
    - D. None of the above.
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